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JULY. 1934.

EDITORIAL.

**Fruit Research
in Java.**

The recent visit of Mr. J. N. Milsum to Java to study fruit cultivation in that country, an account of which will be found in this number, again brings to the fore the subject of fruit cultivation in Malaya to which we drew attention in last month's number of this Journal. On that occasion, our comments dealt mainly with the economics of fruit-growing in Malaya. The present article is concerned more particularly with the technical aspect of the subject.

The Horticultural Bureau of the Department of Economic Affairs is responsible for the fruit work in Java and Sumatra. With three research experiment stations and twelve European officers it has been possible to initiate research work along several lines and results of great value are already emerging from this organisation. We are indebted to the Government of Netherlands India and particularly to the Head of the Agriculture and Fishery Service, Java, and to his officers, for providing facilities for Mr. Milsum to see the work in progress, and for permission to publish his report in this Journal.

The work of the Bureau of Horticulture is concerned not only with scientific research on fruit culture, including economic investigation of distribution and yields of the different kinds of fruit trees, but also with the supply of large quantities of good quality planting material.

Perhaps the most interesting aspect of this work is the method adopted for raising large quantities of good varieties of fruit for distribution. Technique in this respect has advanced considerably in recent years. In this connexion, it is noted that in many cases, the method now adopted of raising stocks of planting material results in early fruiting. Perhaps the greatest deterrent to fruit-growing in this country is the length of time which must elapse before any return on outlay may be expected. It is largely for this reason that fruit growing is confined to cultivation on a small scale. The production of good fruit in a shorter period should encourage cultivation on a larger scale.

In a comparison between fruit-growing in Malaya and Java one cannot avoid reference to climatic differences between the two countries. Java experiences more defined seasons than does Malaya, a factor of profound importance in fruit-growing. With our more equable climate, the choice of fruits which may be cultivated successfully is more limited than in Java. The difficulty

is not so much that the fruits cannot be grown successfully, but that flavour is affected. It is perhaps dangerous at this juncture to particularise, but at a venture, we suggest that Malaya will always prove less suitable than Java for citrus fruits and mangoes. On the other hand, there are a large number of fruits, such as rambutans, mangosteens and chikus, particularly suited to our climate, and while we would not suggest neglect of research work in Malaya on the citrus fruits, we do emphasise the prospects of early improvements by concentration on varieties of fruits well-suited to local conditions and on the wide distribution of improved stock throughout the country.

**Agriculture in
Labuan and Brunei.**

The Director of Agriculture paid a visit to Labuan and Brunei in 1932 to advise the Governments concerned on the agricultural development of these territories. His report included a scheme for the establishment of agricultural services, designed in particular to effect improvement in the agriculture of the small-holder. An account of this visit, in so far as it concerned agriculture in Brunei, was published in the *Malayan Agricultural Journal* in November 1932.

The recommendations put forward as a result of that visit have been adopted by these two Governments, in so far as the financial position permitted, and an agricultural service has been inaugurated. At the present time the work is under the Agricultural Field Officer, Singapore, who makes periodical visits, but it is expected that in the near future, a senior agricultural officer will be resident in Brunei. The nucleus of an Asiatic staff has been appointed and is receiving training at the School of Agriculture, Malaya, and at other Stations of the Department of Agriculture in this country.

In the meantime, work has progressed towards the establishment of suitable agricultural stations in both Labuan and Brunei. Work is necessarily somewhat restricted in the absence of personnel, but as will be realised by the article on Agricultural Progress in Labuan and Brunei, which is published in this number, the foundation for future work is being well laid and will prove a great saving of time at a later date when the staff is available to develop the present projects.

Original Articles.

FRUIT CULTIVATION IN JAVA*

BY
J. N. MILSUM,
Assistant Agriculturist.

Introductory.

Owing to differences in climate and soil, Java is well suited for the production of almost all tropical fruits. A large indigenous population, mainly composed of small landowners, has resulted in extensive areas of fruit being planted, and in many districts fruit cultivation is an important item of native agriculture.

It is not possible in this place to record in detail the investigations conducted by the Bureau of Horticulture of the Department of Agriculture and Fisheries, regarding native fruit production in Java. The results of a detailed enquiry, made in 1925-1926 in the surroundings of Batavia were published in *Landbouw*, II, 1926-1927, p. 923. It is shown that in two districts, Meester Cornelis and Kebajoran, in the residency of Batavia, a total area of 23,520 acres was planted with fruit trees. Each inhabitant possessed half an acre of land containing fruit trees. Small areas of rice fields and arable land were owned in addition. The number of ponies and cattle in the two districts was considerable and averaged one animal to every two acres of land cultivated. The manure obtained from this stock is extensively used for manuring the fruit trees. The enquiry disclosed the fact that the average number of fruit trees per acre, in the two districts named, was 33, not counting banana plants and salak palms, *Salacca edulis*.

From an inspection made in part of these districts by the writer in April, 1934, it appeared that fruit cultivation had increased and is the main source of income of the inhabitants.

The soil is rather poor, but by its physical condition well suited to the cultivation of all fruit trees, excluding mangoes and bananas. Rubber is not planted. A system exists whereby almost every landowner undertakes to rear a heifer or young bull for dairymen living near the large towns, in return for the manure obtained. A small cash payment is, in some cases, made to the landowner when the animal is returned to its owner. Ponies and goats are also kept on many holdings. The animals are stalled in small bamboo shelters with atap roofs and fed almost solely with grass clippings, collected from adjacent open spaces. Working ponies receive a small daily ration of rice bran. The pen manure thus obtained is utilized in manuring the fruit trees in the various holdings. The advantage of consistent manuring, especially of pomeloes, appears to be fully realized, and large crops of fruit are obtained as a result of this practice.

* The following article is written as the result of a visit to Java during the period 22nd. April to 5th. May, 1934. A week was spent at Ragoenan Experiment Station, when a close enquiry was made regarding experimental fruit cultivation with special reference to methods of propagation.

Distribution of Fruit Cultivation.

Fruit trees are extensively grown in West Java, between Batavia and Buitenzorg. Those of special importance are pomelo, rambutan, and chiku. Mangoes are largely grown in East Java, where the marked dry monsoon suits the requirements of this important fruit. Centres of production are Madoera and Pasoeroean; also Cheribon and Indramajoe on the northern coast between West and Mid-Java. Oranges thrive best at high elevations and are extensively grown at Malang and Garoet. Mangosteens are produced in West Java and also at Jogjakarta. Bananas are grown on a large scale at Banjoewangi in East Java, and exported in some quantity to Australia.

The production and distribution of fruit in Java is dealt with in detail in *Mededeeling van de Afdeling Landbouw*, No. 19, Vruchtenhandel en Cultuur in Nederlandsch-Indie. As an indication of the internal fruit trade in Java, it may be stated that the transport of fresh fruit on the State Railways in 1929 amounted to 70,000 metric tons valued at approximately seven million guilders. The export of fruit from Java to the outlying districts of the archipelago in 1930 amounted to 3,662 metric tons valued at 446,000 guilders. Outside the Dutch East Indies the principal port of destination is Singapore. In 1930, 1,697 metric tons of fruit valued at approximately 170,000 guilders were thus exported. Some 216,600 bunches of bananas were shipped from Banjoewangi to Western Australia. The cultivation, marketing and shipping of fruit is almost entirely in the hands of natives.

With regard to the return obtained by the growers, investigations disclosed some interesting facts. At Garoet, the citrus centre, in 1929, the average proceeds derived from the sale of fruit amounted to guilders 43.75 per compound per annum, representing approximately 21 per cent. of the total income. In the Batavia district, the most important fruit centre in Java, this figure amounted to 45 per cent. The mango-growing districts produced fruit valued at 5,330,000 guilders, whilst in the districts surrounding Batavia the proceeds arising from the cultivation of fruit trees were estimated at six million guilders.

The Annual Report of the Horticultural Division for the year 1932 shows that fruit production in Java is of great importance and, owing to the thickly populated towns, a large amount of internal transport by rail is necessary to meet the demand. Approximately 12,065 metric tons of fruit were carried by rail from Batavia to the different residencies, the majority being distributed in West Java. The quantity of oranges and mangoes from East Java transported by the State Railway amounted to 1,050 metric tons and 4,860 metric tons respectively. Persimmons and oranges from Garoet amounted to 919 metric tons and 604 metric tons. A total of 903 metric tons of mangosteens were railed from the surroundings of Jogjakarta. Shipment of fresh fruit to Singapore amounted to 1,140 metric tons, mainly from Soerabaja, Cheribon, Bali, and Batavia.

Work of the Horticultural Bureau of the Department of Economic Affairs.

The bureau is administered by the Head of the Agricultural and Fishery Service with a Horticultural Adviser and two technical assistants. These officers are stationed at headquarters in Batavia. Some twelve European officers are engaged on fruit work in Java and Sumatra. Three research experiment stations are controlled by the bureau; Ragoenan near Batavia; Bedali near Malang, and Pasoeroen, both in East Java. Ragoenan is the main experiment station and is dealt with in detail in this article. The experiment station known as Bedali, is situated 1,575 feet above sea-level and is concerned with the experimental cultivation, and propagation for distribution, of oranges, mandarins, and lemons. The average yearly rainfall is 74 inches. This station, comprising 22 acres, was opened in 1928 in order to encourage the cultivation of citrus in East Java.

Mangoes thrive exceedingly well on the plains in East Java and receive particular attention at an experiment station, (area 30 acres) known as Pohd-jentrek, near Pasoeroean. This station, opened in 1919, is situated on the plains and has an average yearly rainfall of 52 inches. Trial plots and experiment stations number about thirty, and are distributed throughout the main fruit-growing districts of the country. Several are situated in the hills with the object of assisting settlers, including Europeans, in the production of hill fruits such as oranges, grape fruits, avocado pears, and persimmons.

The main lines of work undertaken by the Horticultural Bureau are as follows—

- (i) Research in fruit culture.
- (ii) Supply of good quality planting material.
- (iii) Supervision of local fruit distribution.
- (iv) Chemical examination of fruit varieties.
- (v) Bee-Keeping in relation to fruit cultivation.
- (vi) Recording native fruit crop yields.

Investigations concerning diseases and pests are conducted at the Institute for Plant Diseases, Buitenzorg.

Fruit Culture at Ragoenan Experiment Station, Pasar Minggóe.

This experiment station, opened in 1921, is situated some 12 miles south of Batavia. Three estates make up the station and comprise 500 acres, of which about 320 acres are under cultivation. The station is concerned solely with research in connexion with fruit cultivation, and since it is in the centre of a large fruit-growing district, is particularly well suited for the purpose.

SOIL.—The soil at the station is similar to that in the Batavia district and thence to the foot of the mountains. It consists of an ancient andesite tuff laterite of very great depth. The surface soil is deep red in colour with an almost

complete absence of sand. Although described as a clay, the soil is very porous and crumbles readily when dry. It contains about 4 per cent. of organic matter and 0.1 per cent. of lime. A remarkable feature is the small amount of potassium present (0.005 per cent. soluble in 2 per cent. citric acid solution). Plant growth shews ready response to phosphates and nitrogenous manures when applied to this soil. During wet weather the soil is particularly sticky and difficult to work but it soon dries out. Artificial irrigation is necessary during the dry monsoon and a comprehensive system of irrigating channels has been installed.

CLIMATE.—The average rainfall at Pasar Minggu is 90 inches per annum. The main precipitation is from November to April, known as the West Monsoon. During the East Monsoon, *i.e.* May to October, the rainfall is considerably less with some rather dry periods. Temperatures appear to be very similar to those obtaining in Malaya.

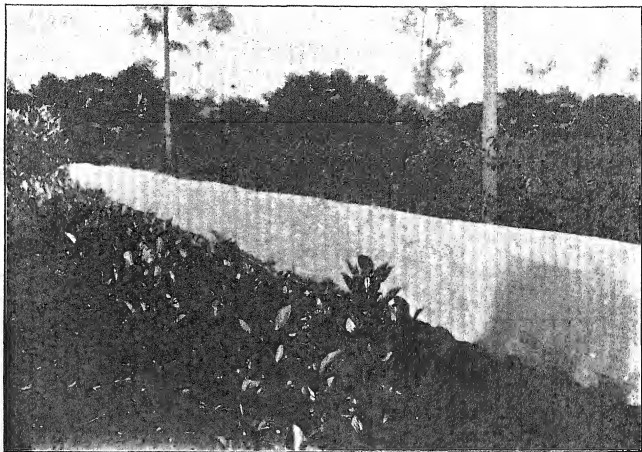
The Technique of Fruit Tree Propagation.

Ragoenan Experiment Station was selected originally as a suitable site to conduct investigations in fruit culture, since it is in the centre of the most important fruit-growing district in Java. Material of the major fruits has thus been collected without much difficulty. With regard to the indigenous fruits such as pomelo, rambutan, and duku, and others of less importance, the opportunity has been taken of attending all exhibitions and tracing the trees that have produced fruit of superior quality. Periodical inspections are made during the fruiting season in all small holdings, and trees of superior quality marked and numbered. Since all fruits are propagated asexually, it has been found possible to gather together a representative collection of the finest fruits occurring in Java. In the course of these trials many selected trees have been discarded, and so far as possible only those varieties of superior quality and practical value are retained and propagated for distribution. Exotic fruits, such as citrus, avocado pear and mango, have been imported. Considerable research has been necessary to ascertain suitable stocks for these importations, especially for the commercial varieties of citrus.

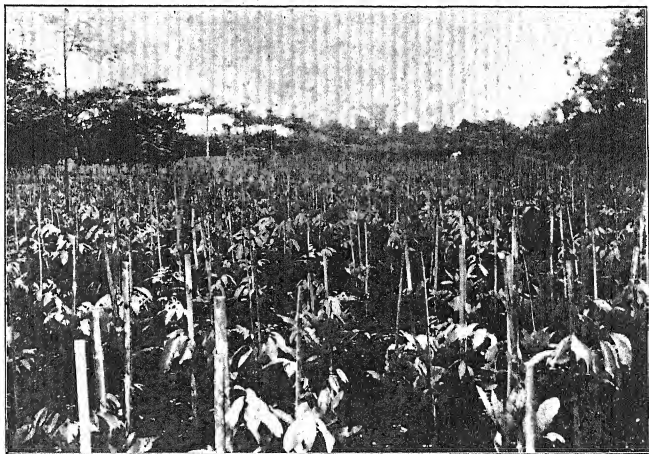
Nurseries for Raising Stocks.

The standard method at Ragoenan of propagating almost all tropical fruits is by budding, mainly on to seedling stocks. Since the future behaviour of the fruit tree depends to a great extent upon a well-grown stock, it is of paramount importance that this branch of nursery work be given proper attention. The question of suitable stocks for different fruits is dealt with under a subsequent heading. It is proposed to record here how stocks should be raised.

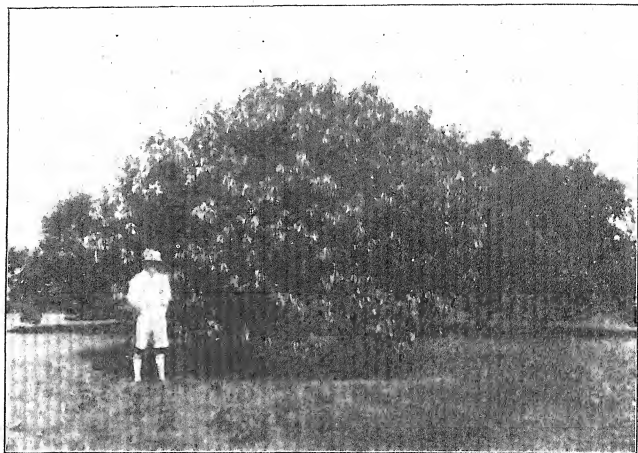
The site of the seed bed should be on good soil that is well drained and capable of producing strong seedlings. It should be situated as near as possible to a water supply as watering during dry weather is often necessary. At



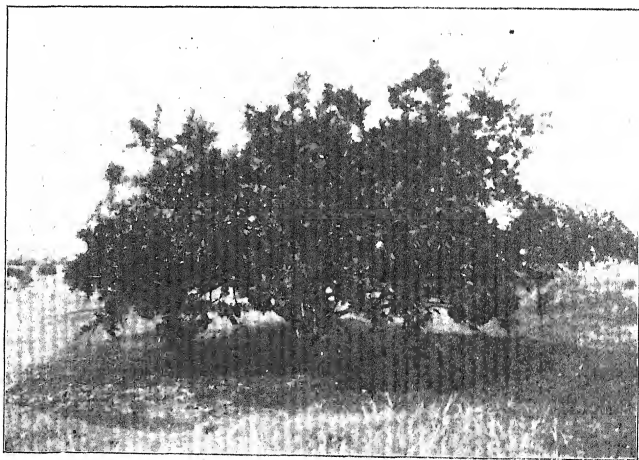
JACK FRUIT IN NURSERY
Young trees four months old from budding.



RAMBUTANS IN NURSERY
Rambutan Seenjonja on Rambutan Seematjan stocks, three months after
budding



BUDDED RAMBUTAN
Five Years from Planting.



ORANGE IN BEARING
Valencia Late Orange on Rough Lemon Stock, Nine years old.

Ragoenan Experiment Station, where dry weather is experienced during the East Monsoon, artificial irrigation is undertaken. On present information it is doubtful whether this is essential in Malaya, although probably advantageous. The beds should be 4 feet wide, of convenient length, with paths 18 inches to 2 feet between each bed. The size of the seedling beds at Ragoenan is 50 feet by 4 feet, and this size is taken as a standard throughout this report.

The cultural treatment will naturally depend upon the tilth and fertility of the soil. Assuming that the land has been under cultivation previously, the soil should be rested before use and planted with a suitable cover crop, e.g. *Calopogonium mucunoides*. When required for use the beds should be deeply trenched and the green matter dug into the soil. Well-rotted cattle manure is then placed on the land at the rate of about 1,000 lbs. per bed. This is incorporated into the soil by a second digging. The amount of cattle manure applied to the land each time it is required for raising seedling stocks appears extraordinarily heavy, but experience has proved that to obtain satisfactory results, this is necessary. A dressing of artificial fertilizers is then applied to the beds and raked in. The usual dressing is a mixture of basic slag (4 lbs. per bed) and sulphate of potash (2 lbs. per bed). The bed is then in a suitable condition for sowing the seeds.

A light high shade is considered an advantage and *Sesbania grandiflora*, a light-leaved leguminous tree, may be used for this purpose. A few trees per acre of nursery only should be planted, since it is necessary to prevent root competition with the fruit seedlings.

In seed-sowing the procedure adopted varies according to the kind of fruit stock it is desired to raise. Fruits, such as the rambutan, durian, jack fruit, guava, duku, and avocado pear, are sown in three rows one foot apart, the seeds being spaced one foot apart in the rows. A light shade of rough ataps* placed on a bamboo structure two feet above the soil, is necessary, since the shade assists the seedlings during the early stages of growth. Regular watering and weeding is essential after sowing, and at all times the soil should be kept stirred in order to provide a surface mulch. The attacks of injurious insects must be guarded against. When the seedlings are about six months old, the tap root is cut back several inches by means of a long knife inserted beneath the soil. This operation should be carried out during wet weather. When the seedlings reach the atap roof of the shelter, shade is gradually removed in order to harden the seedlings preparatory to budding. Under suitable conditions the seedlings are ready for budding one year after sowing. Should growth be slow during the seedling stage, one or more applications of a nitrogenous fertilizer e.g. sulphate of ammonia, at the rate of 1 lb. per bed, may be applied to the soil between the plants and raked in. The treatment of the seedling beds is outlined in tabular form below —

* Ataps: a roof of leaves.

Treatment of Seedling Stock Beds.

Area	Cattle manure	Artificial fertilizers.	Period of growth.
50 ft. x 4 ft.		4 lbs. basic slag.	
		2 „ sulphate of potash.	
(200 sq. ft).	1,000 lbs.	1 lb. sulphate of ammonia. (one or more applications).	One year.

Citrus stocks require rather different treatment from that outlined above. As is generally known, citrus plants are very liable to insect attack, and to secure clean growth during the seedling stage the beds are enclosed in a covering of light cambric. This is a necessary precaution against the leaf miner, *Phyllocnistis citrella*. The seedlings are transplanted before being used for budding.

The seeds are sown with the pointed end downwards to secure straight taproots. The distance of planting is about $2\frac{1}{2}$ inches apart either way. After sowing, the entire bed is covered with white cambric, placed over a bamboo structure two feet from ground-level.

Germination of most stocks takes place within 3 to 4 weeks. Under average condition, the citrus seedlings are fit to be transplanted when six months old. They are carefully lifted from a moist seed bed and the taproot cut back a few inches, and planted in similar beds in three rows, each seedling being spaced one foot apart. A cambric covering is used for a further month to encourage the seedlings to become established. Budding may be undertaken one year after sowing the seeds.

Several other factors require mention with regard to the two principal citrus stocks used in Java; namely, propagation from cuttings and selection of seedling stocks. Both the rough lemon and Japanese citron may readily be raised from cuttings and serve equally well for stocks as seedlings. Cuttings about one foot long of hardened wood are selected and planted deeply in prepared beds under cambric covering. The exposed cut surface is coated with a mixture of paraffin wax (92 per cent.) and carbolineum (8 per cent.) in order to guard against fungus attack. Cuttings so treated produce roots in 4 weeks and may be transplanted a month later. Budding may be undertaken when the cuttings are six months old, and these are ready for transplanting at least six months earlier than seedlings. In citrus the growth of the scion is considerably influenced by the stock. The seedlings of most stocks are partly of vegetative and partly of generative type. It is necessary to discard the latter, since only vegetative seedlings should be used for budding. Weak seedlings and those with deformed taproots should be rigorously excluded. This subject has been dealt with by Dr. H. T. Toxopeus, in *Landbouw* VII, No. 10. In practice,

it is found that only 30 per cent. of Japanese citron seedlings and 70 per cent. of rough lemon seedlings are suitable for use. Should the seedlings begin to form side branches at any time, the branches should be removed, as a single stem is required for budding.

It will be seen from the preceding remarks that the amount of work in connexion with raising budded fruit trees is considerable. The actual cost, including supervision, of producing budded trees at Ragoenan Experiment Station made it necessary to charge 35 and 75 guilder cents per plant, to Asiatic and European, respectively.

Budding.

The usual method of budding is a modification of the Forkert method. While seedlings and cuttings can be readily grafted by several different methods, these are not commonly practised, since budding is so much simpler, quicker, and more economical of budwood than is any method of grafting. Budding is generally performed during the rainy season when the bark is in an active state of growth. Most fruits, however, may be budded at Ragoenan throughout the year, suitable conditions being indicated when the bark will separate readily from the wood. Javanese labourers become very adept at budding, and a skilled workman will bud 400 stocks per day, provided that the budwood is supplied to him.

Budding by the modified Forkert method consists in making a transverse incision in the bark of the stock as far as the cambium, after which the bark over a length of $1\frac{1}{2}$ inches and a width of $\frac{1}{4}$ inch is pulled down, either as one piece or else in several small strips. Should the bark fail to peel properly or tear off in small pieces, this indicates that the cambium is inactive and in an unsuitable condition for budding. Success by this method is greatest just before new shoots are produced.

In the ordinary Forkert method, which was used formerly with very unsatisfactory results, the bark is not pulled down, but is cut loose. The modified Forkert method, has the advantage that, before commencing operations, it is possible to ascertain whether the stock is fit for budding. Further, accuracy is possible in removing the bark of the stock exactly to the cambium layer without cutting and removing any wood.

From the strips of bark torn loose, two thirds are cut off, and the ends trimmed. A shield-shaped bud with no wood adhering is then inserted and bound up with raffia. With the majority of fruits waxed tape is unnecessary.

The budwood obtained from selected trees, is usually cut into pieces about one foot long, each piece carrying a number of dormant buds. The budwood should be of good normal growth, well-rounded and sufficiently hardened to permit of handling. Generally, non-petioled budwood about one year old is used, but at times this is difficult to obtain. When leaves are present on the previous year's wood, suitable budwood may be obtained by removal of the leaves about three weeks before use. This is often necessary in the case of rambutans.

A knife of fine steel is employed and a hone kept at hand to enable the knife to be sharpened as often as necessary. A cloth is used to remove any moisture or soil adhering to the stem of the stock.

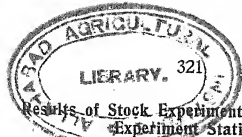
The distance of the bud from the ground is determined by the conditions under which the trees are to be used. Certain citrus stocks are liable to be affected by fungus disease should the bud union come in contact with surface water or damp soil. For this reason, where the budded trees are to be planted in moist situations, high budding is undertaken. With other fruits, less liable to collar disease than citrus, or where the land is drier, the bud may be within three inches from the ground.

About three weeks after budding, the raffia is removed and the scion commences to grow. The portion of the stock above the union is cut back to within four inches of the growing bud. Three months later the remaining portion of stock wood above the sprouted bud is carefully removed. After growth commences it is necessary to provide a bamboo stake, from two to three feet high, to each tree, and to tie the shoot to the stake from time to time with strong raffia or coarse string. This is of considerable importance, since it is during the early stages of growth that a strong single stem should be formed. When the shoot is about three feet high it is generally topped, thus commencing the formation of a framework for the tree. The majority of fruit trees are sufficiently advanced for transplanting within six months to one year from budding.

While the plants are in the nursery, regular attention is given to insect control by spraying with lead arsenate and soap and kerosine emulsion. Citrus trees are sprayed with Bordeaux mixture two months before transplanting as a preventative against *Diplodia*. Budded stocks of certain fruit trees such as the rambutan, durian and duku, are difficult to transplant from the nursery. When preparing such trees for despatch by rail it is necessary to establish them in large bamboo baskets. The young trees are gradually hardened by removing the lower portion of the taproot and side shoots whilst in the nursery beds. After the trees have been placed in bamboo baskets they are kept under shade for a month until fresh growth commences. Those successfully established are gradually moved into full light and are then ready for despatch. The chiku and duku are both difficult fruits to raise as budded plants, the former because its growth is slow and the latter owing to its dislike of root disturbance.

Treatment of Various Fruit Trees.

The results of ten years' experimental work with the vegetative propagation of a large number of fruit trees, obtained in the different experiment stations in Java, have been published in *Landbouw* VI, No. 10, p. 944. It is not possible to refer to these results in detail, but the summarized table below records briefly the experience gained at Ragoenan Experiment Station. Citrus requires further explanation, since the work undertaken with these important fruits is extensive. This is dealt with under a separate heading.



Results of Stock Experiments at Ragoenan
Experiment Station.

The following abbreviations are used under the headings of Budwood, and Season of Budding —

- n = non-petiolated budwood.
p = petiolated budwood.
n/p = either non-petiolated or petiolated budwood.
1 = one-year-old wood.
2 = two-year-old wood.
w = rainy season.
d = dry season.

SECTION.	STOCK.	Age of stock months.	Budwood.	Season of Budding.	Successful buds. per cent.
Anacardiaceae					
<i>Anacardium occidentale</i>	<i>A. occidentale</i>	6	n 1	w	85
Cashew Nut.	Cashew Nut.				
<i>Mangifera indica</i>	<i>M. indica</i>	12	p 1	d	80-90
Mango vars.	Mango seedlings				
	<i>M. foetida</i>	12	p 1	d	70
	Bachang				
	<i>M. odorata</i>	10	p 1	d	80-90
	Kolani				
<i>Spondias dulcis</i>	<i>Spondias dulcis</i>				
'Kadongdong'	'Kadongdong'	10	n 1	w	45
Annonaceae.					
<i>Annona muricata</i> .	<i>Annona muricata</i>	10-12	n 1	d.w.	100
Soursop.	Soursop.				
<i>Annona reticulata</i>	<i>A. muricata</i>	10-12	n 1	d.w.	95-100
Bullock's Heart	Soursop.				
<i>Annona squamosa</i>	<i>Annona squamosa</i>	12	n 1	d.w.	95
Custard Apple	Custard Apple.				
Bombacaceae					
<i>Durio zibethinus</i>	<i>Durio zibethinus</i>	9	n 1	w	90
Durian.	Durian.			d	40
Caricaceae.					
<i>Carica Papaya</i>	<i>Carica Papaya</i>	5	n 1	d	90
Papaya	Papaya.				
Euphorbiaceae.					
<i>Baccaurea Motleyana</i>	<i>Baccaurea Motleyana</i>	14	n 1	w	50
Rambai.	Rambai.				
	<i>B. recemosa</i>	14	n 1	w	50
Flacourtiaceae.					
<i>Flacourtia indica</i>	<i>Flacourtia indica</i>	22	n 1	w	80
Rokam.	Rokam.				
	<i>F. inermis</i>	9	n 1	w	80
	Lovi-lovi				
<i>Flacourtia inermis</i>	<i>Flacourtia indica</i> .	22	n 1	w	90
Lovi-lovi.	Rokam				
	<i>F. inermis</i>	9	n 1	w	90
	Lovi-lovi				

SCION.	STOCK.	Age of stock months.	Budwood.	Season of Budding.	Successful buds, per cent.
Lauraceae.					
<i>Persea americana</i>	<i>Persea americana</i>	9	n l	w	80
Avocado Pear	Avocado Pear.				
Meliaceae.					
<i>Lansium domesticum</i>	<i>L. domesticum</i>	48	n l	w	60
Duku.	Duku.				
<i>Sandoricum Koetjape</i>	<i>Sandoricum Koetjape</i>	11	n l	d.w.	60
Kechapi	Kechapi				
Moraceae.					
<i>Artocarpus integra</i>	<i>A. integra</i>	10-12	n l	d.w.	50-95
Jack Fruit.	Jack Fruit.				
	<i>A. Champedan</i>	10-12	n l	d.w.	50
	Champedan				
	<i>A. rigida</i>	12	n l	d.w.	50
	Tampunan				
<i>Artocarpus communis</i> .	<i>Artocarpus rigida</i>	12	n l	d.w.	50
'Sukun'	'Tampunan'				
<i>Artocarpus Champedan</i>	<i>Artocarpus integra</i>	10-12	n l	d.w.	50
'Clumpedak'	Jack Fruit.				
Myrtaceae.					
<i>Eugenia oquea</i>	<i>Eugenia javanica</i>	12	n l	w.	70
'Jambu ayer'	Wax jambo.	11	n l	w.	85
	<i>E. densiflora</i>				
	(wild species in Java)	12	n l	w.	95
<i>Eugenia javanica</i>	<i>Eugenia javanica</i>				
Wax jambo	Wax jambo.	11	n l	w.	90
	<i>E. densiflora</i>	12	n l	w.	90
<i>Eugenia Jambos</i>	<i>Eugenia javanica</i>				
'Jambu ayer mawar'	Wax jambo.	11	n l	w.	90
	<i>E. densiflora</i>	12	n l	d.w.	95
<i>Eugenia malaccensis</i>	<i>Eugenia malaccensis</i>				
'Jambu bol'	'Jambu bol'	13	n l	d.w.	100
<i>Psidium Guajava</i>	<i>Psidium Guajava</i>				
Guava	Guava.				
Oxalidaceae.					
<i>Averrhoa Bilimbi</i>	<i>Averrhoa Bilimbi</i>	9	n l	d.w.	100
'Bilimbing buloh'	'Bilimbing buloh'				
<i>Averrhoa Carambola</i> .	<i>Averrhoa Carambola</i>	12	n l	w.	100
Carambola.	Carambola.				
Rutaceae.					
<i>Citrus aurantifolia</i>	<i>Citrus nobilis</i> hybrid	12	n/l	d	90
Lime.	Japanese citron				
	<i>Citrus Limonia</i>	12	n/l	d	90-95
	Rough Lemon.				
<i>Citrus sinensis</i>	<i>Citrus nobilis</i> hybr.	12	n/p l	d	95
Sweet Orange vars.	Japanese citron.				
	<i>C. Limonia</i>	12	n/p l	d	95
	Rough lemon.				
	<i>C. sinensis</i>	12	n/p l	d	95
	Local sweet orange.				

Scion.	Stock.	Age of stock months.	Budwood.	Season of Budding.	Successful buds. per cent.
<i>Citrus Limonia</i>	<i>Citrus nobilis</i> hyb.	12	n/1	d	90
Lemon varieties	Japanese citron.				
	<i>C. Limonia</i>	12	n/1	d	90
	Rough lemon.				
<i>Citrus medica</i>	<i>Citrus nobilis</i> hyb.	12	n/1	d	80
Citron.	Japanese citron.				
<i>Citrus maxima</i>	<i>Citrus nobilis</i> hyb.	12	n/p 1	d	90-100
Pomelo	Japanese citron.				
	<i>C. Limonia</i>	12	n/p 1	d	90-100
	Rough lemon.				
	<i>C. sinensis</i>	12	n/p 1	d	90-100
	Local sweet orange.				
	<i>C. maxima</i>	12	n/p 1	d	90-100
	Pomelo vars.				
	<i>C. Aurantium</i>	12	n/p 1	d	90-100
	Saramacca citron (sour orange).				
<i>Citrus nobilis</i> var.	<i>Citrus nobilis</i> hyb.	12	n/p 1/2	d	90
Mandarin orange	Japanese citron.				
	<i>C. sinensis</i>	12	n/p 1/2	d	80-96
	Local sweet orange.				
Sapindaceae.					
<i>Nephelium lappaceum</i>	<i>Nephelium lappaceum</i>	12	n/l	w	90-100
Rambutan vars.	Rambutan.				
<i>Nephelium mutabile</i>	<i>Nephelium mutabile</i>	12	n/l	w	90
Pulasan vars.	Pulasan.				
Sapotaceae.					
<i>Achras sapota</i>	<i>Achras sapota</i>	36	n/l	d/w	60
Chiku varieties.	Chiku.				

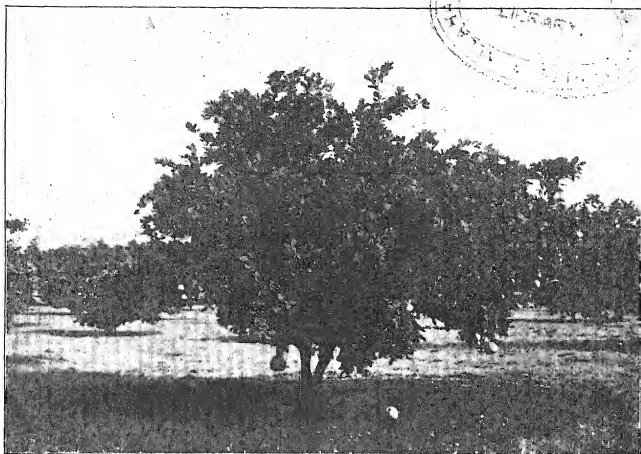
Certain fruits, such as mangosteen, duku, chiku and several of the *Eugenias*, have proved either not amenable to treatment as budded trees, or unsatisfactory on account of the time taken to mature. It would appear that, in such cases, etiolated shoots or marcotted plants might be planted with advantage. Investigations on these lines offer great possibilities, since it may be found possible to select and propagate suitable stocks for such fruit by vegetative reproduction.

Citrus Culture.

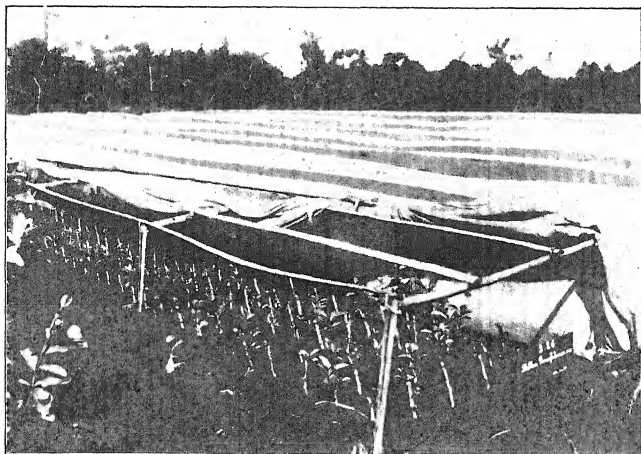
In the following tabulated list those citrus which have proved suitable in Java are recorded, with remarks regarding any special requirements:—

CITRUS.	VARIETIES.	REMARKS.
<i>C. medica</i>	Citron	Little economic importance.
<i>C. Limonia</i>	Pondorosa lemon Villafranca lemon	Thrives from 4000 feet downwards. Used in manufacture of lime-squash.
<i>C. aurantifolia</i>	Lime Tahiti lime	Generally cultivated. Grown on sour orange stock.
<i>C. maxima</i>	Pomelo Delima Balena Pandanalima Bali Secmanalagi Pandan wangi Pandan bener	Most successful on the plains. European market. " " Chinese market " Native market. "
<i>C. paradisi</i>	Grape Fruit Duncan Marsh Seedless MacCarty Triumph Manis besar	Thrives from 5000 feet downwards with greater success on the hills. } } } } } } Imported varieties. A local type that succeeds on the plains.
<i>C. Aurantium</i>	Sour orange Bigaradier Saramacca citron	Resistant to disease but of little importance. An imported rootstock.
<i>C. sinensis</i>	Sweet orange Washington Naval Valencia Late Norris Jafna Iramku Pineapple Manis	) ) ) ) ) ) ) ) ) From 3500 feet downwards. Greatest success is obtained on the hills with these imported varieties. An excellent fruit at Ragoeman. A local form. European market.
<i>C. nobilis</i>	Mandarin orange King orange Siam Satsuma Tjeena Leetjin	From 3500 feet downwards. Successful on the plains. Local form.

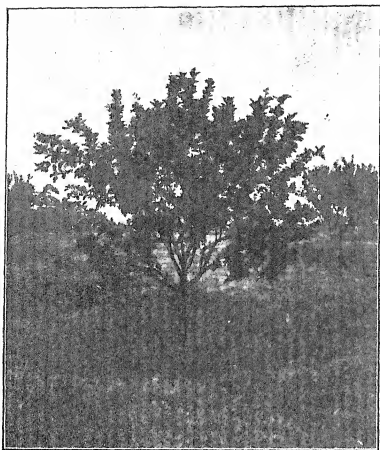
In addition to the stocks for citrus already enumerated, recent investigations have shown that the Saramacca citron, a sour orange, is suitable for pomeles, grape fruit, and lemon. Experiments are in hand to obtain a satisfactory stock for imported grape fruit varieties. The following stocks are under trial—sour orange, Bigaradier orange, sweet lime, Japanese citron, rough lemon, sweet orange.



POMELO IN BEARING
Pomelo Delima on Japanese citron stock, seven years old.



CITRUS PROPAGATING BEDS
Cuttings of Rough Lemon, five months old, as stocks. Showing cambric covered shelters.



BUDDED GRAPE FRUIT SHOWING FRAME
Manis besar on sweet lime stock.



LEMON IN BEARING
Ponderosa Lemon on Sour Orange Stock, four
years old.

Diseases and Pests.

Several diseases cause severe damage in the citrus orchards. Gum disease, *Phytophthora parasitica*, attacks the bark at ground level and may cause the death of the tree. Treatment consists of excising the diseased bark, after which the wound is smeared with a mixture of paraffin wax and carbolineum, in the proportion of 92 to 8. The sweet orange is particularly liable to this disease in Java. Recent investigations have proved that inarching seedlings of rough lemons or Japanese citron at the base of severely diseased trees saves many affected trees*. Diplodia gum disease, *Diplodia natalensis*, attacks the bark of the trunk and the main branches. The treatment is similar to that outlined above. Canker, *Pseudomonas Citri*, and scab, *Sphaceloma fawcettii*, attack the leaves, young growth, and fruits of most citrus and cause a corky excrescence. The infection takes place when the leaves and fruits are young. Both diseases may be effectively controlled by fortnightly spraying with Bordeaux mixture shortly before the young leaves appear and after the fruits have formed. A dry Diplodia (*Diplodia sp.*) attacks the smaller branches. It can be controlled in the early stages by spraying with Bordeaux mixture.

Insects pests are numerous. Mites, which damage the leaves and fruit, are kept in check by sulphur dusting. The larvae of a fruit fly and Citrus moth, *Citripestis sagatiferella*, frequently cause great damage to pomeloes and grape fruit. The only practical method to be employed in combatting these pests is to enclose individual fruits in paper or cambric bags, four weeks after setting. Several scale insects are troublesome and, unless attended to, may render the fruit unsaleable. Scales are kept in check by fortnightly spraying with kerosine and soap emulsion. Ants are responsible for the presence of certain scales, and the former are excluded from the trees by attaching a band of wire gauze covered with glue to the base of the tree. Mealy bugs and aphids are controlled by spraying with kerosine and soap, or 2 per cent. alcohol and soap emulsions.

Particular mention is made of the more important diseases and pests occurring at Ragoenan, since, without adequate control measures, the cultivation of citrus would undoubtedly be a complete failure.

Field Cultivation.

Planting is undertaken during the rainy season, when the soil is in a moist condition and the young fruit trees are not liable to receive any check. Most trees are planted with a stem about 2½ feet high. Citrus are usually cut back and four strong shoots allowed to grow. From planting to maturity constant attention to the growing trees is necessary. This is specially so in the case of citrus, which are very liable to serious disease and insect attack at all stages of growth. The land may be under leguminous crops or grass, but a wide circle round each tree should be cultivated and kept free from weeds. At Ragoenan Experiment Station, artificial irrigation is provided throughout all planted areas wherever practicable. It is not possible, without further experience, to say

* Root Renewal of Citrus Trees with Gum Disease, *Landbouwc*, VII, No. 5, p. 372.

whether irrigation is necessary under conditions in Malaya. Pruning is an important consideration, especially during the early stages of growth. The main object is to provide a suitable frame of strong main and lateral branches. Citrus trees, which are cut back severely before planting, tend to form a good head naturally. Certain fruit trees, such as the rambutan and pulasan, may be induced to form new growth for the next season's crop, by light pruning of the outer branches after the crop has been harvested.

Manuring.

Under the conditions obtaining at Ragoenan Experiment Station, heavy manuring is found necessary to secure adequate growth and yields from all varieties of fruit trees cultivated. Three large-scale field experiments are in hand. An area of 14 acres with Rambutan Seematjan on Seematjan stocks, planted in December, 1930, provides 504 trees under fourteen separate manurial treatments, including control plots. There are six trees in each plot with six replications randomised throughout the area. The trees commenced to flower in September, 1933, and the first crop of fruit was gathered in January, 1934. The trees in the plots receiving cattle manure or cattle manure together with artificial fertilizers, were more advanced and yielded a heavier crop than trees receiving artificial fertilizers alone, or in conjunction with legume and/or lime incorporated in the soil. A similar manurial experiment was commenced with an area containing 618 pomelo trees planted in 1932, and grape fruit trees planted in October, 1933. Cattle manure is dug into shallow trenches on the outer perimeter of the trees, whilst artificial fertilizers are spread beneath the trees and lightly covered with soil. The following treatment is commonly practised with young fruit trees at Ragoenan and serves as a guide to the manurial programme considered necessary.

Manuring of Young Fruit Trees.

Year.	Treatment per tree.	Remarks.
1	50 lbs. cattle manure	At planting.
2	100 lbs. " "	
3	150 lbs. " ") Trees in bearing.
4	2 lbs. sulphate of ammonia	
	4 lbs. basic slag	
	2 lbs. sulphate of potash	
5	-do- -do-	plus 100 lbs. cattle manure.
6	-do- -do-	
7	As 4th. year.	

Future treatment depends upon the appearance of the trees. Citrus trees in full bearing require heavy manuring with additional quantities of potash.

Yields.

The majority of budded fruit trees commence to bear during the third or fourth year from planting. The durian, duku and Jack fruit, bear fruit when about six years old. As already stated, the staff of the Bureau of Horticulture collects data annually regarding yields from the major fruits cultivated in a number of districts throughout Java. In the following table the average yields of fruit per tree, from fifty trees of different ages in Pasar Minggoe district for a varying number of years are recorded. The average maximum yield for the same period is given for comparison. Present prices, which the growers receive, are appended —

Yield of Fruit in Kampongs at Pasar Minggoe.

Fruit.		Average yield per tree.	Average maximum yield per tree.	Number of years.	Prices 1934 Guilder cents.
Mango local	...	482	2,600	3	1
Soursop	...	27	96	3	3-4
Bullock's Heart	...	78	413	3	—
Durian	...	72	252	5	5
Duku	...	782	5,220	5	—
Jack Fruit	...	10	71	5	50
Chempedak	...	62	331	5	15
Rose Apple	...	353	2,057	4	1
Guava	...	359	2,902	3	25 cts. per 100
Bilimbing	...	262	1,038	4	60 „ „
Lime	...	385	2,000	4	10 „ „
Lemon	...	90	500	4	50 „ „
Pomelo :					
Pandauwangi	...	203	678	8	4
Delima	...	154	478	8	6
Mandarin Orange	...	667	3,423	4	25 cts. p. 100
Rambutan :					
Seematjan	...	126(x)	474(x)	9	3.2. 25 per 100 bunches.
Lebakhoeloes	...	156(x)	549(x)	9	„
Manis	...	127(o)	471(o)	9	„
Chiku	...	1,373	4,392	7	6 cts. p. 100

(x) In bunches of 15 fruits.

(o) In bunches of 25 fruits.

The prices which growers receive are now at a very low level.

Records of yields of various fruit trees at Ragoenan Experiment Station, collected during 1933-34 are as follows:—

Yields of Fruit at Ragoenan.

Fruit.	Average fruits per tree.	Remarks.
Sweet Orange:		
Norris	334	7 year old budded trees.
Manis	349	-do-
Valencia Late	166	5 year old trees on rough lemon stock.
"	262	8 year old trees on rough lemon stock.
Sweet Orange:		
Manis	264	6 year old trees on rough lemon stock.
"	180	6 -do- -do-
"	436	6 year old trees on own rootstock.
Mandarin Orange:		
Satsuma	160	6 year old trees.
Sian	146	4 year old trees on Japanese citron stock.
"	150	4 year old trees on rough lemon stock.
King	147	On Japanese citron stock.
Pumelo Bali	128	7 year old trees on sweet orange stock.
"	141	7 year old trees on rough lemon stock.
"	128	7 year old trees on Japanese citron stock.
"	108	5 year old trees on sour orange stock.
"	170	7 year old trees on pumelo stock.
Rambutan:		
Seematjan	2,400	8 year old budded trees.
Lebakboeloes	1,460	6 year old budded trees.

Acknowledgments.

The writer is grateful to the Head of the Agriculture and Fishery Service, Java, for kind permission to visit the Ragoenan Experiment Station. Mr. J. J. Ochse, Chief of the Bureau of Horticulture, Batavia, and Mr. M. M. Magiels, Manager of the Experiment Station, Pasar Minggu, afforded every facility in conducting the investigations and spared no pains in giving all necessary information. The writer desires to record his sincere thanks to these two officers.

NOTE ON THE VALUATION OF SOME NATURAL PHOSPHATES

BY

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and

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A series of experiments with some naturally-occurring phosphates has been carried out recently in which attempts have been made to correlate the phosphate contents of the materials, as determined by their solubilities in various reagents, with the results of pot experiments, using maize as the indicator crop.

The phosphates used in the experiments comprised two samples of Perlis phosphate*, one sample of Gafsa rock phosphate and one sample of Cheribon rock phosphate.

As regards the analytical work, determinations were made of (a) degree of fineness of grinding using a 100-mesh sieve, (b) total amount of phosphate, (c) amount of phosphate soluble in 1 per cent. citric acid and (d) amount of phosphate soluble in 6 per cent. acetic acid. Acetic acid was employed to eliminate possible solution of iron and aluminum phosphate.

The methods employed for the determinations of the total and the citric acid soluble phosphates followed those laid down in the Official Methods of Analysis prescribed by the British Fertilisers and Feeding Stuffs Act. In the case of acetic acid, treatment consisted in boiling one gramme of the material with 100 c.c. of 6 per cent. acetic acid for one hour under a reflux condenser. The liquid was filtered and the phosphoric acid in the filtrate determined by the appropriate method.

Table I.
Details of Fineness of Grinding and Phosphate Contents
with Various Reagents.

Details of Fertiliser.	Proportion of Material passing 100-mesh sieve.	Total Phosphate. as P_2O_5	Citric Acid Soluble Phosphate. as P_2O_5	Acetic Acid Soluble Phosphate. as P_2O_5
	per cent.	per cent.	per cent.	per cent.
Perlis No. 1 ...	68	6.9	1.3	1.5
Perlis No. 2 ...	82	20.6	16.5	8.0
Gafsa Phosphate ...	94	29.3	12.5	5.4
Cheribon Phosphate ...	76	29.6	12.9	6.0

* These local phosphates are usually known as guanos. They contain, however, negligible quantities of nitrogen.

The results of analysis are shown in Table I. In order to make the results comparable, all the figures have been calculated on a moisture-free basis.

The results of analysis indicate that, although the second sample of Perlis phosphate has a lower phosphate content than either the Gafsa or the Cheribou material, a higher proportion is soluble both in citric acid and acetic acid.

In the pot trials, the quantity of phosphate was adjusted so that the total amount present was equivalent to 30 lbs. of total P_2O_5 per acre. In order that the plants should not suffer from deficiency of nitrogen or potash, calcium cyanamide was added at the rate of 168 lbs. per acre and potassium sulphate at the rate of 56 lbs. per acre.

The differences in growth were striking and were obviously not in accordance with the total amounts of P_2O_5 present as will be seen from the accompanying photographs (See Plate I).

With such a trial, it is not possible to say whether growth was more in accord with the citric soluble or the acetic soluble phosphate. In the case of the citric soluble portion, Perlis No. 2 has more than 12 times the amount of Perlis No. 1, while the ratio is about 5:6 in the case of the acetic acid soluble phosphate.

Two broad conclusions can, however, be drawn:—

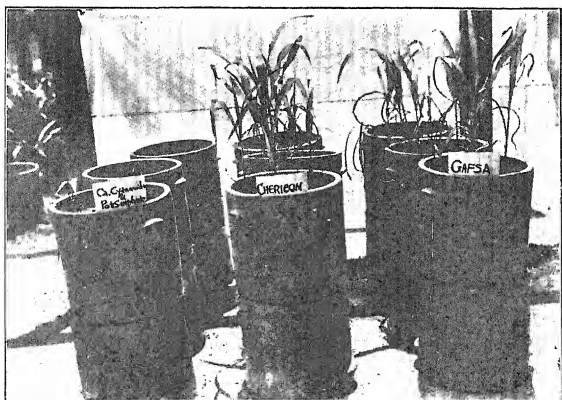
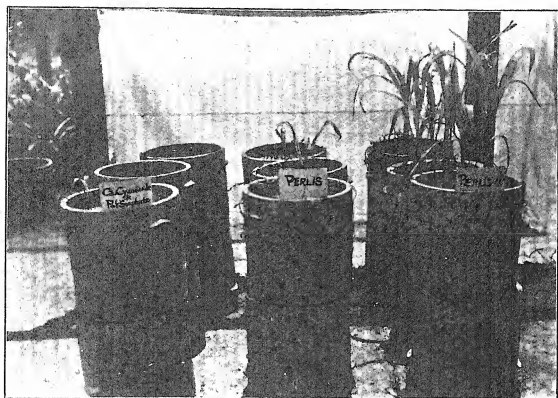
- (i) It is useless to buy local guanos without some knowledge of the phosphate content.
- (ii) The total phosphate is not a criterion of the value of such fertilisers.

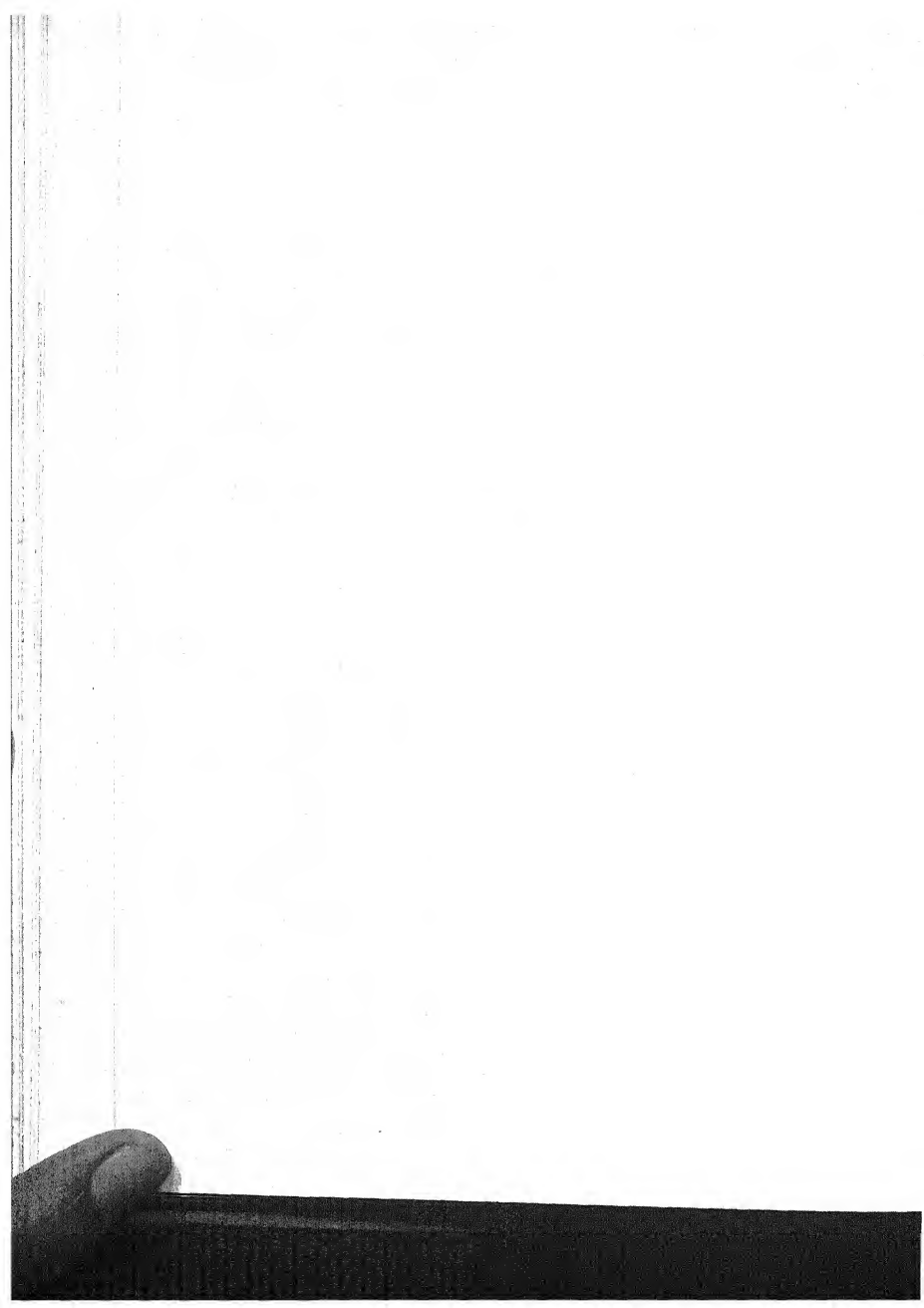
Intending purchasers are, therefore, advised in all cases to obtain an approximate analysis of the material giving quantity of phosphate soluble in dilute acid.

Further, in view of the wide variation in composition shown by the two samples of Perlis phosphate, care should be taken to ensure that the sample submitted for analysis is representative of the consignment. This is especially necessary when the fertiliser is to be applied to quick-growing annual crops.



PLATE I.





AGRICULTURAL PROGRESS IN LABUAN AND BRUNEI*

BY

G. D. P. OLDS,

Agricultural Field Officer, Singapore.

Part I - Brunei.

A visit to Brunei was timed to coincide with the padi harvest, but the season being somewhat earlier than usual, harvesting had finished in most districts by the middle of March. The main objects of this visit were the inspection and further development of work in progress at the Brunei Agricultural Station at Kilanas, the supervision of the harvesting of the padi experiments laid down last August, and furtherance of the general programme of agricultural expansion within the State.

Progress at the Agricultural Station, Kilanas.

Substantial progress with the establishment of this main Station has been made in the past seven months. As is inevitable in the opening of land in a district which, with the exception of one area under wet padi cultivation, is almost entirely under jungle, and which is very thinly populated, pests such as wild pigs, rats, birds, and insects have proved extremely troublesome. Early action was taken, however, to combat these pests and the appearance of the crops indicates the effectiveness of the necessary prevention and control measures taken.

The soil at this Station consists of sedimentary deposits of great thickness, is of a heavy clay nature and difficult to drain or cultivate. It is however, typical of Brunei.

A series of open drains has been dug, but these have not proved adequate and a revised layout has therefore been prepared. An experiment on liming the soil has been initiated.

A large number of different plants have been established at the Station, including well-known fruits, cover and forage crops, and miscellaneous crops of economic importance, most of which are being grown with the object of investigating the growth of crops suitable for cultivation by small-holders under local conditions.

Padi Experiments.

The first series of padi experiments was designed to compare the yields of pure strains of padi from Krian with the locally-grown varieties, and to observe the suitability of the former under local conditions. Insect pests proved troublesome and have affected the results. Although the results from this initial season are inconclusive, Seraup 15 and Siam 76 of the imported

*The following is abridged from Reports submitted by the writer on his visit to Labuan and Brunei between 2nd March and 3rd April, 1934.

strains, seem most suited, yields per acre being 383 and 324 gantang per acre respectively, while a local variety, Sibakit, gave the third highest yield of 323 gantang per acre.

Padi Test Plots have been opened at Kilanas and Lumapas where a number of local strains of padi have been planted for a preliminary study of type and yield with a view to selection work. From the crop obtained, selections were made for planting at a Station in Malaya.

Great interest is evinced amongst native cultivators in the work in hand. The Kilanas Station has now become a general meeting place for Kedayan cultivators, where matters relating to agriculture in general and padi planting in particular are discussed. Moreover, the area surrounding the Station is being opened up for more wet padi cultivation. A considerable extension of this area is anticipated in the coming season.

It is also reported that a demand for fruit tree planting material is beginning to arise in the Kilanas neighbourhood and that intending cultivators look to the Station as the natural source of this material.

Government Rice Mill.

The Government Rice Mill, which was installed in Brunei town in 1933, ran very successfully during its first season and produced a high percentage of rice of good quality. The support forthcoming from the natives was very satisfactory and there is no doubt that the mill serves a useful purpose and is likely to become of increasing value.

Sago Mill.

A proposal is under consideration by a Chinese to establish a sago mill on the Belait River. The proposal is sound provided some guarantee can be afforded to the factory owner that supplies of sago will be regular. Sago is at present manufactured by the usual native methods.

General.

Coffee. At the Government Experimental Plot at Brakas an excellent stand of seedlings both in pots and in beds has been established from imported seed. Some of the bushes have commenced bearing, but a number shew signs of suffering from excess water. Temporary improvement of drainage can be effected, but satisfactory drainage of the Plot will only be attained when the adjoining Brakas Padi Test Plot is in regular use.

Staff. Two Brunei Malay officers have returned on the conclusion of a course of training at the School of Agriculture, Malaya. Arrangements have been made for the distribution of the work between these two officers.

Part II - Labuan.

Plans have been drawn up and the preliminary work of clearing an area put in hand for the establishment of an agricultural station. A Malay officer

will shortly be put in charge of this work on his return from a course of agricultural training in Malaya.

Progress of agricultural development in Labuan is rather held up for lack of a Malay officer to organise the work. An abortive attempt was made in 1932 to form an agricultural society; it has now been decided to await the arrival of the Malay officer before re-considering the possibility of organising the local small-holders into a society.

The presence of an officer is also required for crop pest and disease control.

Enquiry has been made regarding the poultry industry in Labuan. Further efforts are to be made to investigate the possibility of marketing produce, but it is realised that, on account of inaccessibility, this problem presents many difficulties.

Agricultural progress in Labuan has been extremely slow and the Resident, who fully realises the desirability of improving conditions, has experienced many disappointments. It is felt, however, that with the establishment of the Agricultural Station and the arrival of a trained Malay subordinate, definite progress will be possible.

Miscellaneous Article

THE ALL-MALAYAN PADI COMPETITION.

The first All-Malayan Padi Competition came to a satisfactory conclusion with the final stage, or Central Competition, which was held in conjunction with the recent Eleventh Malayan Exhibition.

The reasons leading up to the inauguration of this competition together with the rules governing it, have already formed the basis of an article in this Journal*, and it is here only necessary briefly to recapitulate the salient points.

The competition is divided into two parts: the local or district competitions and the Central Competition at the Annual Exhibition of the Malayan Agri-Horticultural Association in Kuala Lumpur.

Exhibits, consisting of three gantangs (Imperial gallons) of padi, must be of a strain approved for entry in the Competition, and must bear a statement giving the locality of the holding and size of the area from which the padi was drawn, together with a certificate of yield.

Only the three best exhibits from each local competition are admitted to the Central Competition which, consequently, should comprise the best padi in Malaya.

The general response to the competition was extremely satisfactory and encouraging, the scheme being taken up with considerable enthusiasm in the districts throughout the Federated Malay States and the Settlements of Penang and Malacca. As evidence of this it may be recorded that in Negri Sembilan, thirty-five local shows were held. With such a large number of minor competitions, further selection was necessary and actually some fifty exhibits were entered for the Central Competition.

A report on these local competitions in Negri Sembilan, shows that they have attracted considerable attention and that in some centres, more particularly in the District of Kuala Pilah, the quantity and quality of the samples submitted were of a satisfactory order and competition was keen.

The report points out, however, that the general appearance of the padi bore unmistakable evidence of a wet harvest which was reflected in the presence of immature and undeveloped, and also in many cases, mouldy grain. The almost universal presence of grain moth and weevil was also an indication of insufficient drying prior to storage. It is anticipated that the changes in planting dates arranged in most districts for the forthcoming season, will result in heavier yields and sounder grain.

In Perak, a proposal to hold a State Agricultural Show in Kuala Kangsar on May 10th, the birthday of H.H. The Sultan of Perak, made it possible to give particular prominence to the competition. Twelve local shows were held and care was taken that the number of such shows in each District should be in approximate proportion to the area of padi grown.

The three prize-winning exhibits from each local show were sent to the State Show, and were also eventually entered in the Central Competition, in

**Malayan Agricultural Journal*, Vol. XXI No. 12, December 1933.

accordance with the rules. The State Show thus served as a supplement to the Central Competition and did much to stimulate local interest.

Some 160 exhibits were received for the Central Competition and were suitably displayed at the Eleventh Malayan Exhibition. Preliminary judging on the day before the Exhibition reduced the number of possible winners to forty, from which twelve were selected for final consideration after prolonged and careful judging.

The exhibits reached a particularly high standard of quality which can be gauged by the fact that the judges were occupied for four hours in dealing with the selected forty exhibits, the final twelve being subjected to further very careful scrutiny and tests before the six awards were made.

Judging was carried out on a basis of 100 marks, allotted as follows:—

1. Purity of sample	...	...	...	30
2. Type of grain	...	...	...	20
3. Condition and uniformity of ripeness	...	...	...	20
4. Condition and uniformity of grains	...	...	...	10
5. Weight per volume	...	...	...	10
6. Cleanliness	...	...	...	10
				<hr/>
				100

Purity of sample is most important as it denotes understanding and care in the selection of seed. An unduly impure sample is eliminated immediately. Items 2 and 3 also apply to preliminary judging more particularly, condition and uniformity of ripeness being an important point as indicating whether the padi ripens evenly and quickly and thus can be harvested rapidly.

The first prize was won by a sample of a high-yielding variety of padi, known locally as "Mayang Sa-Batil", from Balik Pulau, Penang. The grain of this variety is broad, plump and of medium length, with a moderately thin, white husk. The sample was remarkably free from blemishes, even, in size and ripeness and of high density.

This strain of padi is well established in Penang Island. Part of the sample is being used by the Department of Agriculture for planting at the local Padi Test Station during the present season in order to produce material for pure line selection.

The second prize was awarded to a sample of the high-yielding pedigree strain Siam 29 from Malacca. This is a locally selected strain of a variety very popular and widely grown in Malacca. It is a padi maturing in about six months, having a long, somewhat slender, cylindrical grain with a thin, white husk. It has a good flavour and is of good type for milling.

The third prize was awarded to a sample of the well-known Radin variety from the Kuala Kangsar District of Perak. This was almost certainly derived from the pedigree strain Radin 4 which has a slightly humped, fairly broad

grain of medium length, with a reddish brown husk. Radin 4 is a strain of padi maturing in about 7 months and giving a high yield of grain.

The fourth prize was won by a sample of Radin from the Raub District of Pahang, while two samples of Serendah Kuning from the Kuala Pilah District of Negri Sembilan won the fifth and sixth prizes. This latter variety is very popular in the District, but has not yet been subjected to pure line selection. The grain of the prize-winning samples was, however, fairly even in size, uniform in type and of good quality.

It is noteworthy that awards were fairly evenly divided amongst the competing States, thus implying general excellence of the padi entered for competition.

A further point of interest is that one outcome of the Competition has been to encourage the holding of District Agricultural Shows in conjunction with the district padi competition. Thus, Agricultural Shows for various kinds of agricultural products and local handicrafts were held at Balik Pulau, Bukit Mertajam, Telok Anson and Temerloh in the six weeks immediately preceding the Malayan Exhibition.

Although there were on this occasion no exhibits from any of the Unfederated States, the inability of these States to participate was due, in part at least, to the comparatively short period available for organising the competition. Arrangements, which include the distribution of some 4000 gantangs of seed of pedigree strains of padi selected at the Telok Chengai Station from popular local varieties, have already been made for the participation of the State of Kedah in next year's Malayan Competition. It is hoped that certain of the other Unfederated States may also be able to send exhibits next year.

In conclusion, it can fairly be claimed that the competition was an unqualified success and achieved its objects, in that it has stimulated interest throughout Malaya in padi planting and has ensured that the prize-winning exhibits at the Malayan Exhibition definitely represent the best padi in Malaya.



Abstract.

PRUNING OF TEA IN RELATION TO ESTATE PROFITS*.

It has always been realised that it is possible to reduce the yield and capital value of tea bushes by gross errors in pruning, but what is not realised is that the value of the methods in every-day use vary to an extraordinary extent according to the elevation of the estate and the climate it enjoys.

Dr. Gadd at the Tea Conference of 1929 showed that, in his experience, a deficiency of starch in the roots was the predisposing cause of death after pruning, and that the fungus *Botryodiplodia Theobromae* was of minor importance, merely playing a secondary part in attacking bushes already dying from physiological causes. One line of Mr. Tubb's work at Galatura and in the laboratory at St. Coombs has been the confirmation of his work and its extension to include dieback and the investigation of its effect on yield and growth.

He collected sixty-nine samples of roots from tea of approximately eighteen months after pruning from all over the tea districts. An examination of the total carbohydrates extractible by a standard acid extraction showed that the percentage of carbohydrates in the roots varied according to the elevation of the field of tea, and that when plotted against elevation the points tended to fall on to a straight line. This line, when statistically calculated, showed that, on the average, the percentage of carbohydrates rose from 10.13 per cent. at sea level by 0.232 per hundred feet to 26.37 per cent. at an elevation of 7,000 feet. In other words, the highest tea in the Island has more than two and a half times as much carbohydrates in the roots as the lowest. By no means all the carbohydrates extracted by the acid treatment used are available for use in recovery after pruning. Bushes that have died after pruning commonly contain about twelve per cent. Thus, unless the bushes at pruning time contain a balance over this amount when pruned, the food is not available to enable new shoots to be produced, and death, partial or complete, must follow.

The probable fundamental cause of this difference in the size of the carbohydrate balance at different elevations is temperature. Temperature falls by approximately three and a half degrees Fahrenheit for every thousand feet of higher elevation. The higher the temperature, the greater the rate of photosynthesis, growth, and respiration of a plant. Photosynthesis is the process of carbohydrate manufacture, and the higher temperatures of the Low-country will speed up the process during the hours of the day in which light is available for the process. But the breakdown of carbohydrates by respiration is also speeded up—and this proceeds throughout the twenty-four hours, instead of for only about twelve hours a day. In addition, the enhanced growth rate calls for more carbohydrates to be used directly in building up leaves, stems, and roots instead of being stored up as reserves.

* Abstract of a lecture given before the Sabaragamuwa District Planters' Association, by F. R. Tubbs of the Tea Research Institute of Ceylon and published in *The Tea Quarterly*, Vol. VII, Part I, February 1934.

Thus, as a result of climatic differences, the bush at a high elevation contains within its roots ample reserves to enable its recovery from pruning, while those at low elevations do not.

Manuring and cultivation have sometimes been suggested as remedies. Manures have their very distinct place in the scheme of maintaining the health of the bush, but what is wanted in the Low-country at pruning time is carbohydrates within the bush. Leaves are the organs for manufacture of these substances and it follows that, if the bush has not sufficient carbohydrates stored up by the end of its cycle to enable full and healthy recovery from pruning, it must not be deprived of its sole source of fresh supplies.

Leaves must be left on the bush at pruning time in such cases. Mr. Tubbs states that he would adopt this procedure at any elevation below 1,500 feet above sea level. Any form of cut-across gives the desired result, but this method suffers from two disadvantages. Firstly, often insufficient leaves are left, and secondly, any dead or diseased wood cannot be efficiently cleaned out. Lung pruning allows of sufficient leaves being left on, and also for efficient and careful cleaning out of the interior of the bush at pruning.

The number of leaves which should remain on the bush depends upon the reserves the bush already possesses. At the lowest elevations well over three hundred leaves should be left. It is not accurate enough to say three or six lungs should be left, for their value depends upon the area of leaf surface upon them. But a count of the leaves left on a few bushes soon gives one an idea of the number remaining which proves a better estimate of leaf areas. At higher elevations progressively fewer leaves will be needed.

Beneficial results from lung pruning can be proved. Taking first the question of the yield of flush from rim lung and clean pruned plots. The cycle of two years of the Galatura experiment will not be complete until the end of April, but it is obvious from the yields to date that pruning in such a way as to leave about two hundred leaves per bush on the lungs till about ten days before tipping has resulted in an increase of crop of over 200 pounds per acre to date. This more than compensates for the extra two or perhaps three rupees an acre required for pruning.

These results on yield are not of prime importance at the moment owing to restriction, but they will be definitely important when restriction ends. The fact that these results were obtained in the first cycle is stressed. It is reasonable to expect that there will be cumulative effects and, if these are of any magnitude, even more striking results may be expected in the future. The continuation of the experiments will decide the point.

There is no evidence to date of any loss of quality due to this enhanced yield, and as the difference in yield appears to be due at least in part to dieback, there is no rational reason for expecting it.

The yield of a tea estate affects both the total revenue coming in and also the cost per pound of putting the tea on the market. But the profit available for distribution is always reduced by the amount of the expenditure required

to maintain the estate in good order as a commercial proposition. It stands to reason, therefore, that if one can, to some extent, reduce the wear-and-tear on the bushes—a smaller proportion of the gross profits will be absorbed in replacement and in restoring the bushes to good health. It is essential, therefore, to consider not merely the effect of pruning on yield, but also its effect on the maintenance of the capital value of the plant.

In 1932 there were published in *The Tea Quarterly* figures concerning the effect of the method of pruning on the number of deaths after pruning and the amount of dieback in the Low-country. Perhaps owing to the impression that variations in pruning had little effect on yield or profits, the article caused little comment in planting circles. It was shown that the number of deaths per acre, reckoning 3,000 bushes to the acre, was one hundred and thirty-four in the clean pruned plots and only sixteen in the rim lung pruned plots. These figures are sufficiently startling, but in addition there is now data from an experiment at Galatura performed in 1933. In this experiment were observed the effects of (a) 6 lungs left of the bush either one or two months after pruning, (b) 3 lungs left on the bush for either one or two months after pruning and (c) clean pruning. Six lungs carried an average of 327 leaves, three lungs 203, while clean pruning left an average of 3 leaves.

It was found that the six lung treatment resulted in only 22.5 deaths, compared with 28.2 for three lungs and 168.6 for clean pruning per acre of 3,000 bushes. In other words, 327 leaves remaining on the bush for part of the recovery period resulted in decreasing the number of deaths by eighty-seven per cent.

This, as is obvious, has a considerable bearing on estate profits. If replacement of a bearing tea bush costs fifty cents per bush, the 1932 experiment showed a saving of Rs. 59 per acre and the 1933 experiment a saving of Rs. 74 per acre in capital value.

The effect of method of pruning on the health of the bushes that survive has also to be considered. After pruning, the bush may not die completely—it may suffer death of some of its frame branches only. This reduces yield, and provides entrances to disease organisms which bring in their train a whole series of losses. Measurements to date have shown that up to twelve hundred pounds of dead wood per acre may be removed after pruning and even this high figure is sometimes considerably exceeded over small areas. The amount of pre-tipping dieback can be reduced considerably by lung pruning. The figures obtained per thousand bushes were

Clean prune	...	...	236.9 pounds.
3 lungs	...	...	127.3 "
6 lungs	...	...	109.5 "

The method of pruning does not appear to affect the amount of post-tipping dieback, however.

These figures, as might be expected, are reflected in the recovery after pruning. The dry weight of material removed in tipping provides an index of recovery. The weight of tippings from the six lung treatments is more than double that from clean pruning, with the three lung treatment occupying an intermediate position.

It is interesting to note that there is significant evidence that if only about two hundred leaves per bush are left on the lungs, they should be left on for at least two months, whereas with three hundred leaves per bush the lungs can be removed earlier without disadvantage. Figures also effectually contradict the fear that is sometimes expressed that the growth of the lungs is prejudicial to the production of tipping shoots in the centre of the bush.

To sum up, one may, by providing plenty of leaves on the bush during the period immediately following on the pruning operation, reduce the number of deaths and the amount of dieback and increase the rate of recovery and subsequently the yield of the tea by amounts which are sufficiently great to be of considerable importance.

Reviews.

Egg Weight in the Domestic Fowl.

E. M. Funk and H. L. Kempster. Agr. Exp. Stat. Bull. 332, Univ. Missouri Coll. of Agr. Columbia, Missouri, Feb. 1934. 15 pp.

With the growing tendency towards the buying of eggs on a graded basis, the demand for information on egg grades has increased. This Bulletin recounts the investigations on this subject at the Missouri College of Agriculture, and although climatic conditions are dissimilar to those obtaining in Malaya, the conclusions are of value and should serve as a basis of similar enquiry in this country.

The authors find that the weight of eggs laid by pullets during their first few months of production is very definitely related to the month in which sexual maturity occurs. Maximum egg weight was reached during February by pullets which began laying in any of the months from September to February. In other words, maximum weight of egg was obtained during the natural breeding season. It is doubtful whether in Malaya, with its equable climate, a similar relationship could be found, or if found, whether it would be so marked.

The age at which the pullet began to lay influenced the weight of eggs laid. Calculations made to eliminate the influence of body weight shewed that the age at sexual maturity significantly influences egg weight. Egg weight is also influenced by body weight.

Egg weight increases from the first egg to the next few eggs laid, the increase gradually diminishing until the mean egg weight is reached by the time the thirtieth egg is laid.

Eggs produced in the morning are very definitely larger than those laid during the afternoon. This relationship is attributed to the fact that the first eggs laid in a given clutch are larger and are produced in the morning.

The authors show that eggs of maximum weight are produced in the spring months, while smaller eggs are laid during the summer months. They refer to the work of Dr. D. C. Warren of the Kansas State Agricultural College who has shewn that high temperatures cause birds to produce smaller eggs. It is uncertain from the authors' investigations, whether their results in this respect are due to the breeding season factor or to temperature. This question of temperature is one of great importance in Malaya. The results indicate the great value of providing cool quarters for the birds and adequate shade.

The position of the egg in the clutch (group of eggs laid in consecutive days) influences the weight of eggs. The following facts emerge from a study of this factor. The first egg of a clutch is usually the largest laid in that clutch; but if the first egg laid in a clutch followed a rest period of 7 days or longer, it was usually smaller than the other eggs in that clutch. It was also observed

that the decrease in weight per egg was greatest in the shorter clutches and that the total decrease from first to last egg was not materially greater in the longer clutches.

Furthermore, if the first egg in a clutch was a large egg, the decrease in weight of succeeding eggs was much greater than if the first egg laid was a small egg.

The decrease of egg weight within a clutch was greatest during the spring months and least during the colder months.

The largest eggs produced at the Station were those laid by Rhode Island Reds. Within a breed, however, there is a wide variation in the weight of egg produced. These differences may be established by breeding and become strain differences. Large egg size is not confined to any one breed, but can be bred into any of the common breeds.

Egg weight is an inheritable factor. Results of investigations with White Plymouth Rocks shewed that dams which lay large eggs tend to produce daughters which also produce large eggs; similarly, dams which lay small eggs tend to produce daughters with the same character. Egg weight is no doubt also inherited from the male.

Egg weight may be influenced by the ration. It has been shewn that birds receiving milk laid larger eggs than did those receiving meat scrap, tankage, soyabean meal, cottonseed meal, or ground soyabeans. The use of mineral supplements—such as oyster shell, or ground limestone—increases egg weight. Since body weight is related to egg weight, the maintenance of body weight by proper feeding methods would no doubt be helpful in maintaining egg weight. The maintenance of body weight is also essential for high egg production. Stimulation of egg production by the use of artificial lights has not affected egg weight.

In reviewing this work in the light of poultry keeping in tropical regions, two important points emerge; the provision of a well-balanced ration and adequate housing. Seasonal differences there probably are, but local investigation on the lines described by the authors is necessary to identify them. They are important, however, especially to enable the poultry-keeper to estimate how far egg production and size of egg are influenced by factors over which he has no control and how far they are capable of adjustment by the exercise of his care in breeding, housing and feeding.

D. H. G.

Farm Poultry Production.

*L. E. Card and M. H. Henderson. 202 pp. 1933. Illustrated.
Obtainable from Messrs. N. K. Paul & Sons, Post Box No. 12202. Calcutta.
Price Rs. 17.8.0 plus postage.*

The object of this text book is to afford a working knowledge of the principles underlying practical poultry keeping, as applied in those sections of the United States where poultry is an important part of the farm business, but where specialised poultry farming is rather uncommon. The treatment is thus biased in favour of the keeper of the smaller-sized flocks.

The book is divided into eight chapters as follows—The Business of Poultry Keeping, Judging Fowls for Egg Production, Feeding, Housing, Maintenance, Hatching and Rearing, Marketing, and Breeding. In these, the subject matter is presented in a very readable manner, and the whole book is admirable on account of its directness, simple language and good definitions. The theory underlying feeding and breeding is simply, yet adequately explained, and the intelligent student of poultry keeping and the beginner should have but few difficulties with the text.

Naturally, due to the very different climatic and economic environment for which it was written, a certain proportion of the information incorporated is not capable of direct local application. This applies particularly to the details of rations and housing construction, and to the chapter on the marketing of poultry produce. In all the chapters, however, the underlying general principles are explained in such a manner that they can readily be interpreted and applied in terms of local conditions. Similarly, most chapters are noteworthy for their content of information on practical matters which very often puzzle the beginner, *e.g.* how to handle and cull.

The book is essentially one for the student and amateur poultry keeper, and not for the expert, but it should also prove of considerable value to the teacher of poultry husbandry in aiding to draw up a course of lectures and practical work suitable to local conditions.

V. C. D.



Departmental.

FROM THE DISTRICTS.

June, 1934.

*Compiled by the Chief Field Officer from Monthly Reports
submitted by Field Officers.*

The Weather.

The rainfall in the inland area on the west of the Peninsula from South Kedah to the Negri Sembilan border, in Krian District, in the Districts of Bentong and Temerloh in Pahang, and in the Johore Bahru and Kota Tinggi Districts of Johore was above average for the month of June, and was about double the average in the central portion of the Peninsula close under the western side of the main range, while at Cameron Highlands it was as much as three times greater than the previous average for the month. In North Kedah, however, and on much of the western coast, as well as on the east coast of Kelantan and Pahang, it was below average to a varying extent, as for example in the Muar District of Johore, where the drought of the previous two months continued. Elsewhere rainfall was normal, except in Singapore Island where sudden and somewhat severe storms during an otherwise hot dry month produced a rainfall well above the average. In much of the country, conditions became dryer during the last week of the month.

Remarks on Crops.

Rubber.—During the first month of the restriction scheme prices have been steadier than those obtaining during May. The lowest and highest prices in dollars and cents per picul for rubber from small holdings were: Smoked Sheet \$18 to \$27; Unsmoked Sheet \$15 to \$25, prices below \$18 being exceptional. Corresponding prices for May were \$16 to \$34 and \$12 to \$31.50. The Singapore price for Smoked Sheet was \$26, while the Penang price for Unsmoked Sheet ranged from \$22 to \$23.50 per picul as compared with \$24 to \$31.50 in May. Although the Singapore price for scrap rubber was \$11 and the price range in Kedah and Province Wellesley was \$10 to \$15 per picul, there was no demand for this grade in the greater part of the Peninsula and in the few localities where sales were effected, prices varied from \$2 to \$9 per picul.

Production for the month from small holdings was limited to the quota enforced by the operation of the restriction scheme, but is likely to have been further curtailed in some areas by the effect of wet weather in preventing tapping and by the fact that it was not possible to complete the issue of coupons in all Districts.

Conditions of upkeep on small holdings continued to improve. Weather conditions favoured the incidence of bark diseases, but the use of satisfactory measures of control continued to become more general. It was recorded in Province Wellesley and Singapore Island that infected trees were often left untapped, because the quotas permitted by the export coupons could be obtained by tapping only the healthy trees.

Padi.—The price of padi at the Government Rice Mill, Bagan Serai, was reduced to \$1.25 per picul towards the end of the month. In Kedah there was a further slight rise in the price which was equivalent to \$1.10 to \$1.17 per picul in Kota Star District, while in Province Wellesley the range was \$1.10 to \$1.50 per picul. Elsewhere there was little change, the quotations varying from 5 to 12 cents per gantang.

Preparation of the land and the planting of nurseries was commenced in accordance with the prescribed programmes in several parts of the country, of which the more important were the north and central portions of Kedah and Province Wellesley and the north western area of Krian District.

In Kedah over 4,000 gantangs of seed of certain high-yielding pure strains of padi were distributed, either in exchange for an equal quantity of unselected seed or by sale at 5 cents per gantang; such distribution forms part of the programme for the Padi Competition to be held in that State at the close of the present season.

Cocoanuts.—There was a further slight improvement in the average price of copra, the range in different localities being \$1.10 to \$3 per picul. The Singapore price was about \$2.50 as compared with \$2.40 per picul in May.

The first sale of copra prepared on the new Government-aided kiln at Sri Menanti in the Muar District of Johore realised an average price of \$2.98 per picul f.o.b. Muar. This price was 50 cents per picul higher than the local figure and was considered very satisfactory.

Increase in the internal trade in fresh nuts is reported, as for example between the Krian and Larut Districts of Perak and between Pontian and Johore Bahru in Johore. It is also reported that there is at present a profitable export trade in fresh nuts from part of the west coast of Johore by way of Singapore to China.

Pineapples.—Fresh fruit was plentiful and cheap during the month. Price ranges in Johore were: first quality \$1.10 to \$1.50, second quality 90 cents to \$1.10, and third quality 50 cents to 60 cents per hundred. Corresponding prices in Singapore were \$1.60 and 50 cents. In Johore 8, in Singapore 5 and in Selangor 2 factories were working full time.

There was some tendency for fruit to be over-ripe, as growers were holding back supplies in the hope of better prices.

Inspection of the area of some 2,000 acres of pineapples at Mandai in Singapore Island showed that most of the fruits obtained were small, varying in weight from about 2½ to 3 lbs. each. This is not surprising as the plants

are 4 years old, have been grown without manure and with no precautions to prevent soil erosion.

From Johore it was reported that Chinese squatters were going further afield in search of pineapple cultivation and had commenced to clear abandoned *lallang* grass land beyond the 30th mile on the Johore—Ayer Hitam road.

Fruit.—Durians, mangosteens, rambutans and chempedaks were in season in Penang and Province Wellesley. Crops were only moderate and prices in consequence were good. The durian crop was light in Kedah. Durians were also fruiting in Selangor and were in season with mangosteens in Singapore Island, but in Malacca were just beginning to ripen. A poor season for mangoes and horse-mangoes concluded in Malacca and a small crop of horse-mangoes was harvested in Negri Sembilan.

Tobacco.—Prices for sun-dried leaves have remained much the same as in May, being high at \$30 to \$70 per picul in Malacca, Johore and Kelantan, and low at \$9 to \$25 per picul in Kedah, the range elsewhere being \$15 to \$40 per picul.

In one district of Malacca the planted area has diminished owing to the impossibility of continuous cropping on the same land. In Kedah a further 22 acres were planted. In Kluang and Batu Pahat Districts of Johore there has been some additional planting, while small scattered plots have also been planted in parts of Selangor and Pahang for local consumption. There is still a considerable planted area in Central Perak.

Agricultural Stations.

The monthly output of made tea from the Tanah Rata Experiment Station during the last six months has averaged about 1,380 lbs. The rate of yield from the area in plucking has been about 630 lbs. per acre from the bushes averaging 6 years old and 300 lbs. per acre from the younger bushes about 3 years old, the age being reckoned in each case from the date of planting in the field.

At the Pineapple Experiment Station in Singapore, the results of the manurial experiment for the period August 1932 to April 1934 indicate that on this soil significant increase in the number of fruits were obtained from applications of various mixtures of fertilisers and from cattle manure. Phosphate was found to be essential. The plots receiving lime only and pineapple refuse only gave no increase. The results also indicate that the effect of manures is practically exhausted 18 months after application.

Poultry keeping has been commenced at the Kuala Lipis Agricultural Station with six pullets and one cockerel of the White Wyandotte breed received from the Pineapple Station, Singapore.

Padi Stations and Test Plots.

Nurseries were established and cultivation of the land commenced at the Telok Chengai Station in Kedah, Titi Serong and Talang Stations in Perak, the Central Experiment Station in Kelantan and thirteen other Test Plots in various parts of the country. The latter include newly-acquired Test Plots in the Bagan Serai mukim of Krian District and the Kuala Lipis District of Pahang.

The crops planted at the Bukit Merah Test Station in Province Wellesley during the interval between padi seasons were nearing maturity. The best growth was shown by brinjals, chillies, ladies' fingers and tobacco.

At the Kilanas Station in Brunei in the Radin Siak Latin square the three strains Rs. 17, 18 and 24 were all significantly superior to Rs. 7.

Poultry.

Two flocks of birds were destroyed in Krian District during April by a disease diagnosed as *Diphtheritic Stomatopharyngitis*. In June, there were outbreaks of disease in the Selama and Tanjong Malim Districts of Perak. The cause of the former was not diagnosed, the latter is still under investigation by the Veterinary Department. Three other outbreaks occurred in the Kuala Lipis District of Pahang, specimens from which were obtained by the Veterinary Department for examination. In the Kota Tinggi District of Johore fairly heavy loss was occasioned by disease in three areas where numbers of birds are reared for the Singapore market. This outbreak was reported to the Veterinary Surgeon. Weather conditions may have been a predisposing factor, since storms of wind and rain were prevalent during the month.

A few Malays have started erecting improved types of poultry houses and others have obtained from the Agricultural Stations pure bred or half bred cocks with a view to improving their stock of birds.

Malayan Exhibition.

The remarkable success obtained by competitors from the Settlement of Penang in the agricultural section of the recent Malayan Exhibition is illustrated by the fact that the Settlement received no less than 50 first and 50 second prizes. These included, in addition to the first prize in the All-Malayan Padi Competition, the first prize for copra from small holdings and the first prize for hill padi. A Chinese land-owner in Penang Island obtained no less than 10 first and 4 second prizes, including first prizes for cloves, nutmegs and black pepper.

Rural Lecture Caravan.

The Rural Lecture Caravan visited the Larut District of Perak for the period June 14th to 25th inclusive. The demonstrations, which dealt mainly with poultry keeping and control of mouldy rot disease of rubber, were well attended.

DEPARTMENTAL NOTES.

Death of Inche Mohamed Ali bin Mohd. Said.

We have to record with regret the sudden death of Inche Mohamed Ali bin Mohamed Said, Malay Agricultural Assistant, which took place on 4th June, 1934.

Inche Mohamed Ali joined the Department of Agriculture in 1928. At the time of his death he was a promising member of the laboratory staff. His early demise is regretted by his large circle of friends and colleagues at the Department.

Tour of Director of Agriculture.

The Hon'ble The Director of Agriculture, S.S. and F.M.S. visited Singapore and Johore with the Vegetable Oils Committee from 7th to 10th June inclusive. Meetings were held at Singapore, Kukub, Batu Pahat and Muar.

Conference of Field Officers.

A meeting of Field Officers was held in Kuala Lumpur on 4th June 1934 and the following is a brief résumé of the more important points discussed.

Poultry.—The policy to be adopted in relation to the distribution of poultry from Agricultural Stations was discussed.

Among other decisions made it was agreed that it was essential to distribute selected poultry and that three-quarter-bred cocks should be raised for experimental distribution, such birds as were distributed to be kept under observation.

It was also decided that pure-bred hens may be sold, provided that prospective purchasers already possess a pure-bred cock. A list of prices to be charged for stock was drawn up, reduced prices being allowed to approved small-holders.

All-Malayan Padi Competition.—The rules for this competition were considered and amended in the light of experience gained during the first competition recently completed.

Asiatic Rubber Instructors.—The scheme and course of training of these instructors was outlined. Although actually officers of the Rubber Research Institute of Malaya, it was agreed, in order to obtain closer liaison between that Institute and the Department of Agriculture, that the Instructors should work directly under the field officers of the latter Department.

Small-holders' Rubber.—A scheme was proposed and discussed for a competition for small-holders' rubber on the lines of the All-Malayan Padi Competition with local shows and a Central Competition at the Annual Malayan Exhibition.

Appointments.

Mr. C. H. Burgess, B.Sc. (Agr.) has been appointed an Agricultural Officer from 11th May. He arrived in Malaya and assumed duty on 9th June, 1934.

Mr. Burgess will be stationed at Kuala Kangsar as Agricultural Officer, Perak Central.

Mr. W. G. Higgins, Assistant to Statistician, has been appointed an Agricultural Field Officer on a temporary basis from 29th April, 1934.

Leave.

Mr. J. H. Dennett, Assistant Chemist (Soils), has been granted 7 months and 7 days full-pay leave from 13th June 1934, inclusive.

Mr. J. W. Jolly, State Agricultural Officer, Pahang, has been granted 9 months and 1 day full-pay leave from 19th June 1934, inclusive.

Major C. D. V. Georgi, O.B.E., Assistant Agricultural Chemist, has been granted 8 months and 24 days full-pay leave from 23rd June 1934, inclusive.

Agricultural Leaflets.

A new series of Agricultural Leaflets is in course of preparation and when complete will comprise the following:—

1. Tuba Root
2. Gingelly
3. Tobacco
4. Groundnut or Peanut
5. Bananas
6. Cover Crops
7. Green Manures
8. Fodder Grasses
9. Pepper
10. Coffee.

Of these Nos. 1, 2, 4, 5, and 9 have already been published and will be supplied free of charge on application to the Department of Agriculture, S.S. and F.M.S., Kuala Lumpur.



Statistical.

MARKET PRICES.

June, 1934.

Rubber.—The price of rubber was reasonably stable during June and improved from 20 cents per lb. for spot loose in Singapore to 22½ cents per lb. at the close. The average price for the month in Singapore of smoked sheet, equal to London Standard was 21.82 cents per lb. as compared with 21.35 cents per lb. in May. In London the average price in June was 6.46 pence per lb. and in New York 13.36 cents gold per lb. as compared with 6.38 pence and 11.94 cents gold respectively in May.

Weekly prices paid during June for small-holders' rubber at three centres are shown in Table II.

Palm Oil.—The market has again dropped and its course during June is shewn in the following table of the Malayan commodity : basis 5 per cent. f.f.a.

Table I.

DATE	PALM OIL		KERNELS
	L'Pool/Holland/ Hamburg c. i. f. landed weights in bulk per ton £. s. d.	L'Pool/Continent c. i. f. per ton net in barrels £. s. d.	Fair Average Malayan Quality c. i. f. Landed Weight per ton on Continent. £. s. d.
June 6	8 15 0	11 10 0	5 15 0
" 13	9 0 0	11 10 0	5 15 0
" 20	9 0 0	11 10 0	5 15 0
" 27	9 0 0	11 10 0	5 15 0

Copra.—The price of copra in Singapore again appreciated slightly during June, closing at \$2.95 for sun-dried copra, after touching \$3.00. The average price for the month of this grade was \$2.93 as compared with \$2.83 for May. The mixed quality averaged \$2.51 as compared with \$2.35 in the previous month.

Copra cake continued to be quoted at \$1.00 a pikul throughout the month.

Rice.—The average wholesale prices of rice per picul during May were as follows:—Siam No. 2 (ordinary) \$2.60, Rangoon No. 1 \$2.42, Saigon No. 1 (long grain) \$2.50 as compared with \$2.54, \$2.42 and \$2.57 respectively in April. Corresponding prices in May 1933 were \$3.57, and \$2.92 for Siam No. 2 and Rangoon No. 1 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in May were:—Singapore 23, Penang 25, Malacca 23 as compared with 23, 25 and 24 respectively in April.

The average declared trade value of imports of rice in May was \$3.10 per picul as compared with \$3.11 in March and \$3.00 in April of this year.

Tea.—The London price quoted for Malayan tea during May was 1s. 1½d. per lb. Average London prices per lb. during May for tea consignments from other countries were as follows:—Ceylon 1s. 2.93d., Java 11.97d.; Indian Northern 1s. 1.58d., Indian Southern 1s. 2.27d., Sumatra 11.54d. Prices generally shewed some decline over those ruling during the previous month.

Tuba Root (Derris).—Prices continue to advance. The average price during June for roots of good ether extract was \$30.50 per picul. Roots sold on rotenone content averaged \$40 per picul.

Coffee.—The Singapore price of coffee weakened during June. Sourabaya coffee dropped from a range of \$20 to \$21 per picul according to grade, to \$19 to \$20 and Palembang coffee dropped from \$13.50 per picul to \$12.50, an average of \$12.85 as compared with \$16.19 in May.

Aracanufs.—Singapore average prices per picul during June were as follows:—Splits \$2.75 to \$4; Bila Whole \$2.60; Sliced \$12.50 to \$16.35; Red Whole \$4 to \$5.65; Sourabaya Whole \$4.35 to \$5.90; Kelantan Whole \$3 to \$3.63, the price within each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best \$4.06, Medium \$3.71, Mixed \$3.07.

Gambier.—Singapore prices have weakened slightly since the beginning of June, but the average price for Cube No. 1 for the month was \$7.30 per picul as against \$7.19 in May, while the average price for Block dropped to \$4.05 from \$4.25 for May.

Pineapples.—Rather more enquiry in London early in the month resulted in a small temporary advance, the demand tending to slacken towards the close of the month. The average price of Cubes per case for June was \$3.01 as compared with \$3.02 in May but Sliced Flat and Sliced Tall grades both shewed a slight increase at \$3 and \$3.12 respectively as compared with \$2.97 and \$3.07 in May.

Tapioca.—Singapore prices opened at the May level but eased off considerably during the month. Average prices per picul were Flake Fair \$4.33, Pearl Seed \$5.86, Pearl Medium \$6.20 as against \$4.60, \$5.91 and \$6.37 respectively in May.

Sago.—The Singapore market in this commodity during June resembled that for tapioca. Average prices per picul were Pearl, Small Fair \$4.17 and Sarawak Fair \$1.86 as compared with \$4.76 and \$1.90 in May.

Mace.—The Singapore market for mace and nutmegs continued dull and featureless during June. Prices remained steady at \$70 per picul for Siouw and \$50 per picul for Amboina, unchanged as compared with May.

Nutmegs.—The Singapore prices per picul were steady during June at \$22.53 for 110's and \$23.50 for 80's. The corresponding average prices in May were \$22.50 and \$23.

Pepper.—The market settled down again after the May fluctuations and prices eased off considerably. London stocks seem to increase steadily. Singapore average prices per picul in June were:—Singapore Black \$14.85, Singapore White \$33.60, Muntok White \$34.40 as compared with May average prices of \$16.19, \$34.75 and \$35.75 respectively.

Cloves.—Prices in Singapore continued nominal at Zanzibar \$35 and Amboina \$45 per picul.

Table II.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, June, 1934.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.			Kuala Kangsar, Perak.				Batu Pahat Johore
	7	14	21	6	13	20	27	
Smoked sheet			24.50					
Unsmoked sheet	22.62	23.19	23.45					22.56
Rubber*				20.00	22.84	22.00	22.00	

* Wet unsmoked sheet.

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent. No purchases at Batu Pahat on 6th, 13th and 20th June or at Kuala Pilah on 28th June.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackey & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

May, 1934.

Malaya.—The imports into Malaya of foreign rice during May were 49,534 tons and exports 11,688 tons, net imports accordingly being 37,846 tons. The net imports for the period January to May 1934, were 186,155 tons, an increase of 10.1 per cent. over the corresponding five months of 1933.

Of May imports, 47 per cent. were consigned to Singapore, 21 per cent. to Penang, 5 per cent. to Malacca, 20 per cent. to the Federated Malay States and 7 per cent. to the Unfederated Malay States. Of the total, 65 per cent. came from Siam, 33 per cent. from Burma, 1 per cent. from French Indo-China and 1 per cent. from other countries. Of the exports during May, 67 per cent. were shipped to Netherlands India and 33 per cent. to other countries.

The various kinds of rice exported were:—Siam 7,460 tons (64 per cent.), Burma 3,575 tons (31 per cent.), Indo-China 454 tons (4 per cent.), India 39 tons, local production 160 tons (1 per cent.)

India, Burma and Siam.—Latest information available published in the Summary for April, 1934.

Japan.—According to the Ministry for Agriculture and Forestry (*Trans-Pacific Journal*, 17 May, 1934) the stocks of rice in Japan Proper on 1 May, 1934, amounted to 6,406,310 tons.

The demand and supply of rice during the period 1 May, 1934 to 31 October, 1934, were estimated as follows:—

<i>Supply:</i>	Stocks on 1 May, 1934	...	...	6,406,310 tons
	Imports of Korean rice	...	...	434,780 "
	Imports of Formosan rice	...	...	322,580 "
<i>Demand:</i>	Six months' consumption			
	(May/October)	...	..	4,679,240 tons
	Exports	...	...	70,130 "

showing a surplus of 2,414,300 tons.

French Indo-China.—Entries of padi into Cholon, January to May, 1934 totalled 598,252 metric tons as compared with 599,508 metric tons during the corresponding period in 1933, a decrease of 0.2 per cent. Exports of rice for the same period this year were 664,724 metric tons, as compared with 652,116 metric tons for the corresponding period in 1933, or an increase of 1.9 per cent.

Netherlands India.—According to the *Economic Bulletin* dated 16 May, 1934, the area of padi harvested (wet and dry) in Java and Madoera during February, 1934, amounted to 541,671 acres, as compared with 422,617 acres in the corresponding period of 1933, an increase of 28 per cent.

*Abridged from the Rice Summary for May, 1934, compiled by the Department of Statistics, S.S. and F.M.S.

Ceylon.—Imports for the first five months of 1934, totalled 194,942 tons, an increase of 8.1 per cent. as compared with the total of 179,182 tons for the same period in 1933.

Of these imports, 15 per cent. were from British India, 65 per cent. from Burma and 20 per cent. from other countries.

Europe and America.—Shipments to Europe from the East were 512,230 tons for the period 1 January to 17 May, 1934 as compared with 592,900 tons for the corresponding period in 1933, a decrease of 13.6 per cent.

Of the 1934 shipments 42 per cent. were from Burma, 3 per cent. from Japan, 40 per cent. from Saigon, 11 per cent. from Siam and 4 per cent. from Bengal. The corresponding 1933 percentages were 50, 4, 38, 7 and 1 per cent. respectively.

Shipments from the East to the Levant during the period 1 January to 26 April, 1934, were 16,360 tons as compared with 13,891 tons for the same period in 1933, an increase of 17.8 per cent.

To the West Indies and America, 46,385 tons were shipped from the East in the period January to May, 1934, as compared with 40,745 tons during the corresponding period in 1933, an increase of 13.8 per cent.

MALAYAN AGRICULTURAL EXPORTS, MAY, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-May 1933.	Jan.-May 1934.	May 1933.	May 1934.
Arecanuts ...	20,756	9,185	15,521	1,236	2,974
Coconuts, fresh ...	100,609†	37,665†	37,735†	7,013†	6,250†
Coconut oil ...	17,568	7,907	10,750	1,595	2,419
Copra ...	110,543	35,751	38,352	6,591	5,023
Gambier, all kinds ...	2,560	1,040	913	291	220
Palm kernels ...	1,983	612	1,142	194	280
Palm oil ...	12,101	3,753	4,950	1,452	1,038
Pineapples canned ...	59,582	24,577	29,514	6,942	8,854
Rubber ...	459,836§	149,653§	210,672§	33,461§	46,769§
Sago,—flour ...	7,648	1,836	4,131	307	728
" —pearl ...	2,646	886	1,775	221	468
" —raw ...	4,420*	1,688*	2,400*	271*	637*
Tapioca,—flake ...	9,881	5,112	3,585	977	613
" —flour ...	702*	181*	898*	137*	227*
" —pearl ...	17,297	6,952	6,852	1,352	1,606
Tuba root ...	569‡	182	258‡	56	43

† hundreds in number.

* net imports.

§ production.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPEABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING MAY, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1932 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING				ESTATES WHICH HAVE PARTLY CEASED TAPPING				AREA OF TAPPEABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)		
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)	Acreage (9)	Percentage of (9) to (2) (10)						
STRAITS SETTLEMENTS :—															
Province Wellesley	44,734	1,106	2.5	7,717	17.2	872	1.9	8,223	19.7	8,823	19.7				
Dindings	6,969	112	1.6	1,287	18.5	306	7.3	1,399	20.1	1,399	20.1				
Malacca	111,780	4,254	3.8	20,092	18.0	4,303	3.9	24,346	21.8	24,346	21.8				
Penang Island	1,635	260	15.9	332	20.3	77	9.4	592	36.2	592	36.2				
Singapore Island	28,269	4,837	17.1	4,506	15.9	738	2.6	9,943	33.0	9,943	33.0				
Total S.S.	193,387	10,596	5.5	33,934	17.5	6,426	3.3	44,503	23.0	44,503	23.0				
FEDERATED MALAY STATES :—															
Perak	250,951	4,747	1.9	40,192	16.0	13,893	5.5	44,939	17.9	44,939	17.9				
Selangor	308,379	3,024	1.0	47,763	15.5	13,406	4.3	50,787	16.5	50,787	16.5				
Negri Sembilan	228,541	9,171	4.0	37,069	16.2	19,950	8.7	46,240	20.2	46,240	20.2				
Pahang	38,141	2,492	6.5	11,366	29.8	6,132	16.1	13,858	36.3	13,858	36.3				
Total F.M.S.	826,012	19,434	2.4	136,390	16.5	53,381	6.5	155,824	18.9	155,824	18.9				
UNFEDERATED MALAY STATES :—															
Johore	325,747	16,672	5.1	27,678	8.5	21,498	6.6	44,350	13.6	44,350	13.6				
Kedah (a) (b)	126,388	10,292	8.1	12,704	10.0	15,574	12.3	22,996	18.1	22,996	18.1				
Kelantan	21,176	1,209	5.7	5,572	26.3	3,758	17.7	6,781	32.0	6,781	32.0				
Trengganu (c)	4,643	Nil	Nil	186	4.0	186	4.0	186	36.0	186	36.0				
Perlis (a) (b)	957	159	16.6	192	20.0	318	33.2	351	36.6	351	36.6				
Total U.M.S.	479,111	28,332	5.9	46,332	9.7	41,334	8.6	74,664	15.6	74,664	15.6				
TOTAL MALAYA	1,498,510	58,335	3.9	216,656	14.4	101,141	6.7	274,991	18.3	274,991	18.3				

Notes :—(a) Registered companies only and are rendered quarterly.

(b) The figures quoted for Kedah and Perlis are those for end December 1933, and Kelantan end January, 1934. Revised figures will be published when available.

(c) Registered Companies only.

(d) Figures for end December 1933, are not yet available.

MALAYA RUBBER STATISTICS **TABLE I**
AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX,
FOR THE MONTH OF MAY, 1934 IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of 100 acres and over		Imports		Exports		Stocks at end of month						
	Ports	Dealers	Estates of 100 acres and over	during the month	January to May inclusive 1954	during the month	January to May inclusive 1954	during the month	January to May inclusive 1954	during the month	January to May inclusive 1954	Ports	Dealers					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES:—																		
Federated Malay States	...	14,254	8,742	11,658	57,006	12,116	54,404	Nil	Nil	Nil	78	20,703	21,256	83,190	48,840	...	976	3,807
Penang	...	3,694	2,879	18,374	6,499	25,828	...	Nil	62	Nil	78	...	13,443	9,911	40,558	...	299	976
Perlis	...	978	1,556	2,733	13,719	2,552	9,085	Nil	Nil	Nil	Nil	1,411	2,436	7,982	17,982	...	6	486
Kedah	...	27	20	21	25	172	...	Nil	Nil	Nil	Nil	...	...	...	...	...	...	...
Kelantan	...	382	164	231	1,120	908	4,311	Nil	Nil	319	Nil	138	1,968	497	5,690	...	Nil	61
Trengganu	...	53	50	368	1,283	183	614	Nil	Nil	Nil	Nil	...	...	...	...	...	Nil	30
Total Malay States	...	18,797	13,411	18,851	91,524	22,318	94,414	Nil	62	319	78	24,572	42,245	100,001	114,957	...	1,259	5,384
STRAITS SETTLEMENTS:—																		
Malacca	...	3,582	892	1,254	6,331	...	...	Nil	Nil	3	...	4,633	...	18,673	...	...	551	369
Province Wellesley	...	2,291	421	455	2,578	...	...	Nil	Nil	Nil	...	...	...	...	...	...	12	144
Penang	...	7,002	103	108	528	3,571	14,158	Nil	37,416	103,735	...	8,229	Nil	24,666	...	...	...	22
Singapore	...	1,777	58	194	58	2,604	...	2,604	10,729	...	...	...	...	...	...	...	47,191	1,981
Total Straits Settlements	...	9,403	89,249	137	981	25,087	...	25,087	86,659	...	...	...	...	...	...	...	11,868	58,336
Total Malaya	...	11,180	59,201	1,557	2,094	10,576	3,576	14,158	23,691	97,710	103,735	31,564	41,726	136,197	...	...	16,577	73,181
Total Malaya	...	11,180	70,998	14,968	20,873	102,106	23,894	1,68,572	25,691	97,710	103,818	62,959	42,245	297,484	114,957	...	16,577	74,440

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province Welisly Belings M'nt.	Johore Kedah
20	21	22	23	24	25
DRY RUBBER	457	45,593	11,830	429	70
WET RUBBER	549	12,743	2,951	135	182
TOTAL	976	58,336	14,781	564	252

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to May 1934
Singapore	...	48,780 194,038
Penang	...	12,984 66,176
Port Swettenham.	...	8,543 33,579
Malacca	...	742 3,671
MALAYA	...	69,299 297,484

TABLE IV
DOMESTIC EXPORTS

AREA	For month	January to May 1984
Malay States ...	45,975	205,735
Straits Settlements ...	45,975	205,735
MALAYA	...	...

Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

1. Stocks on estates of less than 100 acres and stocks in transit are estimated from the formula: $\text{Production} + \text{Imports} + \text{Stocks at beginning of month} - \text{Exports} - \text{Stocks at end of month} + \text{Consumption}$ (15) + (16) + (19) + (20) + (21) + (22) - (4) - (5) - (6) - (7) - (11) - (12). For the Straits Settlements, Columns (9) and (10) represent purchases by dealers from local estates of less than 100 acres, reduced by 15 % to terms of dry rubber.

than 100 acres, reduced by 15 % to terms of dry rubber.
Dunlop's stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25%^{7/}

Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios:

Domestic exports are estimated by deducting the average monthly dry weight of foreign imports over a period of 2 months from the gross foreign

Domestic exports are estimated by subtracting the value of exports of the later month, exports of the later month,

5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S., and F.M.S., at Singapore on 20 June,

1934.

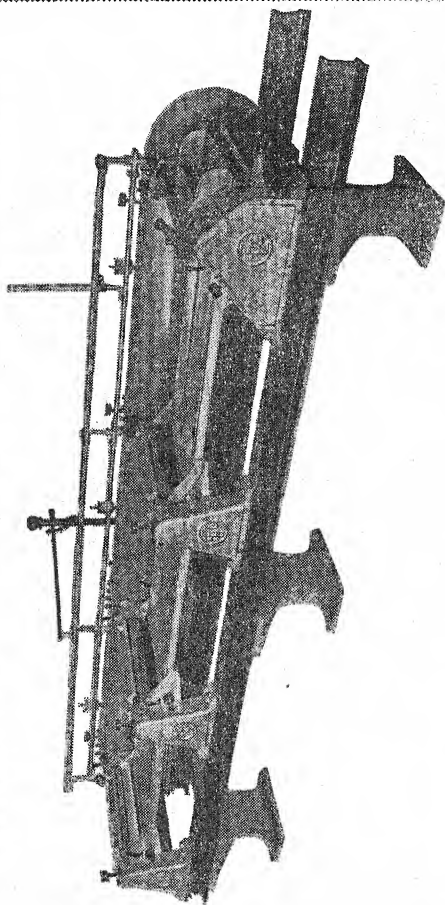
METEOROLOGICAL SUMMARY, MALAYA, MAY, 1934.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT						EARTH TEMPERATURE		RAINFALL						BRIGHT SUNSHINE.				
	Means of			Absolute Extremes			At 1 foot	At 4 feet	Total.		Most in a day.	Number of days.				Total.	Daily Mean.	Per Cent.	
	A.	B.	Min.	Max.	Mean of A and B.	Highest.						Lowest.	Highest.	Precipitation, in or more than 0.1 in.	Precipitation, in or more than 0.1 in.				Thunder-storm.	Fog morning obs.	Gale force 8 or more
	°F	°F	°F	°F	°F	°F	°F	°F	mm.	in.	Amt.	Precipitation, in or more than 0.1 in.	Precipitation, in or more than 0.1 in.	Thunder-storm.	Fog morning obs.	Gale force 8 or more			
Railway Hill, Kuala Lumpur, Selangor	91.9	72.3	82.1	96	70	83	75	84.6	85.2	3.99	101.4	1.41	15	9	3	5	220.75	712	58
Bukit Jeram, Selangor	88.9	72.9	80.9	91	70	82	75	85.3	86.3	4.84	122.9	1.84	9	8	1	1	240.70	776	63
Sitiawan, Perak	90.5	72.5	81.5	93	69	86	75	84.4	84.9	3.17	80.5	0.76	13	8			225.00	726	59
Temerloh, Pahang	91.0	72.5	81.7	94	70	86	76	85.3	86.2	5.28	134.1	1.85	14	11	1		240.10	775	63
Kuala Lipis, Pahang	90.7	71.9	81.3	94	69	86	74	84.7	85.0	3.45	87.6	1.72	8	6	2	21	216.05	697	57
Kuala Pahang, Pahang	88.4	74.6	81.5	93	72	85	78	86.3	85.4	3.37	85.6	1.98	11	9	4		272.25	878	71
Mount Faber, Singapore	87.9	75.9	81.9	90	71	80	80	82.5	82.3	12.12	307.9	4.23	14	11	2	1	230.45	743	61
Butterworth, Province Wellesley	87.5	74.4	80.9	90	72	85	76	84.3	85.0	9.84	249.9	2.36	16	14	3	1	200.25	646	53
Bukit China, Malacca	85.5	74.3	79.9	87	71	81	77	84.6	84.8	7.43	193.7	2.08	16	14	3	1	229.05	739	61
Kluang, Johore	89.1	71.6	80.3	93	69	82	74	82.2	82.4	2.75	69.9	1.02	13	9	6		210.05	678	56
Bukit Lalang, Mersing, Johore	87.9	72.5	80.2	93	70	81	74	82.3	81.9	5.24	133.1	0.98	17	14	3	3	253.65	818	67
Alor Star, Kedah	87.8	75.0	81.4	91	73	84	76	86.3	85.8	9.45	240.0	3.56	21	16	4	1	230.30	743	61
Kota Bharu, Kelantan	90.5	73.8	82.1	93	71	81	76	84.8	84.6	6.88	174.8	2.14	17	14	7		241.10	778	63
Kuala Trengganu, Trengganu HILL STATIONS.	88.6	73.6	81.1	91	71	82	76	83.8	84.7	4.18	106.2	0.98	15	13	7	1	236.10	742	60
Fraser's Hill, Pahang 4268 ft.	75.2	63.5	69.3	80	62	69	65	71.3	71.9	2.80	71.1	0.72	10	9	2	3	214.16	691	56
Pahang Highlands, Tanah Rata, Pahang 4750 ft.	72.3	56.5	64.4	75	50	65	61	70.2	69.7	10.67	271.0	1.83	22	18	1	2	177.50	571	46
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	71.7	59.5	65.6	75	58	62	61			11.61	294.9	2.04	22	18		2	191.85	619	50

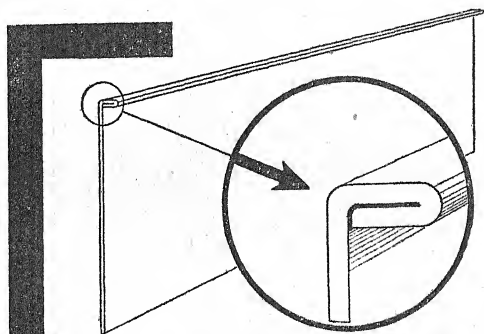
Compiled from Returns supplied by the Meteorological Branch, Malaya.

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MALAYA RUBBER STATISTICS
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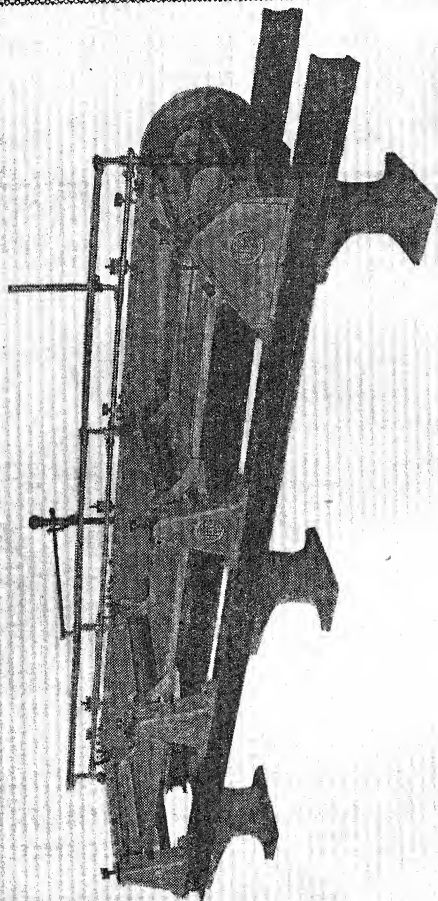
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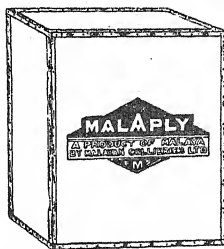
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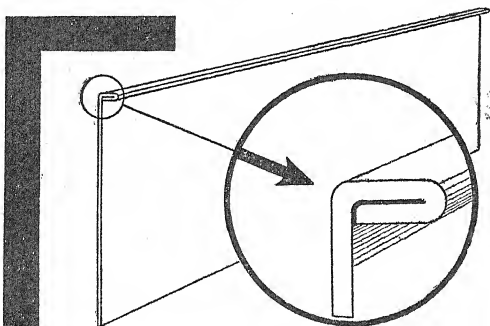
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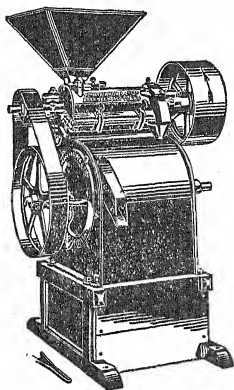
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THE Malayan Agricultural Journal.

AUGUST, 1934.

EDITORIAL.

Bunch-Rot of Oil Palms.

The intensive cultivation of oil palms, such as obtains under plantation conditions, brings to light diseases and other affections which pass unnoticed—if indeed they occur at all—under conditions of natural growth, as in West Africa. This is not peculiar to the oil palm—it is common wherever large populations of a plant are grown.

In some cases, such diseases are endemic, while in other cases they are epidemic, the spread of the disease being due to the large number of trees of one kind in close proximity and to the advent of favourable conditions for such spread. Again, disease may become evident by reason of the lowering of the vitality of the plant through heavy fruiting.

It would seem that this latter is a contributory cause of fruit-bunch rot of oil palms. Mr. R. A. Altson, in an article on this subject included in the present number, finds that the disease affects the fruit-bunches of certain high-yielding strains of the oil palm. Evidence is brought forward to shew that the rot is caused by the saprophytic invasion of tissues whose resistance has been lowered by a nutritional disturbance. It is suggested that the nutritional disturbance is brought about by a soil deficiency; it is considered that this deficiency may be aggravated or induced by artificial pollination. The work, however, has not progressed sufficiently far to enable definite recommendations to be made regarding a manurial programme to make good such deficiencies.

The writer is able to recommend that artificial pollination should not be practised on high-yielding strains at least until they are found to be capable of bringing to maturity their full crops of naturally-pollinated bunches. Where the disease is found to be present it is doubtful whether anything is to be gained by removal and destruction of infected bunches; they should not, however, be sent to the factory as they will adversely affect the acidity of the palm oil.

Insect Pests of Stored Derris.

It is somewhat disconcerting to find that a plant such as derris (tuba root), which is grown and used entirely for its insecticidal properties, should itself be subject to the attacks of insects, both in the growing crop and as a stored product.

The increasing importance of derris and the wide recognition it is now receiving as an insecticide renders it desirable that precautions should be taken to ensure that it be marketed in as perfect condition as possible. Mr. N. C. E. Miller, in an article on "Control of Insect Pests of Stored Derris", which will be found on another page of this number, gives full instructions for the control of such pests. If his precautionary measures are adopted, the exporter may be assured that the consumer will receive the root in good condition.

A Special Bulletin of this Department is now in the Press, which gives a full account of the insects which attack stored derris and methods of control. Owing to the importance of this subject, it is considered that the present account, drawn from the Bulletin, will be welcomed by those engaged in the cultivation and export of derris root.

**Disease of the
Durian Tree.**

Though the durian fruit may not find universal favour, the tree is the most valuable in the small holding. The fortunate possessor of a few durian trees derives considerable financial benefit from the sale of the fruit. The loss of but one tree in a holding therefore, may be a serious matter to the owner. They are very large trees and slow growing, so that any loss is not readily replaced.

Mr. A. Thompson's article on a "Disease of the Durian Tree" describes the recent investigation of a newly recorded disease capable of causing the death of durian trees. Increasing attention and care is taken by small-holders to ensure the health of their crops. Consequently, this contribution to our knowledge of a disease of the durian tree, with methods for its control, will be received by them with more attention than would have been the case a few years ago.

Original Articles.

FRUIT-ROT OR BUNCH-ROT OF THE OIL PALM

BY

R. A. ALTSON,

Acting Government Mycologist.

Introduction.

In August, 1933, an investigation was begun into the nature of a rot of fruit-bunches which was causing considerable losses in a large area of oil palms, not less than 40 per cent. of the crop from about 700 acres being affected. The palms were seven years old and had been raised from selected seed obtained from an estate in Sumatra. That this estate had successfully isolated a high-yielding strain was evident. The number of female inflorescences produced by the affected palms on the Malayan estate in the previous year had been, on an average per palm, more than double that produced in this country by the normal type of Deli palm at the same age and during the same period.

In February of this year a second outbreak of fruit-rot was reported from an estate eighty miles distant from the former area. The palms were seven to eight years old and had been grown from Sumatran seed. The precise origin of this seed was unknown, but it was on record that it had been obtained through A.V.R.O.S.* and had been guaranteed by them to be from high-yielding palms. In their abundant production of female inflorescences the affected palms resembled the palms previously observed, but the absence of suitable data prevented accurate estimates of productivity or of losses being made.

Artificial pollination had been in operation on the estate on which the first outbreak occurred for at least a year before the investigation was begun. On the other estate this practice was initiated only two months before the palms came under observation.

The conclusions which have been reached regarding the origin of fruit-rot suggest that it may make its appearance in certain areas which are shortly coming into bearing. For this reason it has been considered desirable to place on record an account of the disease and of these conclusions.

External Symptoms and their Relation to the Course of the Rot.

The fruit-bunch is the only part of the palm which is affected. Various forms of rot, involving anything from a few fruits to an entire bunch, may occur. Two forms of fruit-rot (base-rot and stigma-end-rot) and two forms of bunch-rot (bunch-end-rot and early bunch-rot) may be distinguished. These are characterised in the following manner.

Base-rot of the fruit. A brown water-soaked lesion appears on the base of the fruit. As this enlarges the fruit becomes detached, but, held in place by its bracts, often continues to rot *in situ*.

Stigma-end-rot of the fruit. Sunken areas appear on the apex of the fruit, the latter eventually becoming shrivelled and dry.

* Algemeene Vereeniging van Rubberplanters ter Oostkust van Sumatra.

Bunch-end-rot. The distal end of a bunch decays and can be pulled out with ease, leaving a basal portion which is frequently unaffected and completes its development.

Early bunch-rot or bunch-rot. As a rule the whole bunch is involved and commonly decays during an early stage of development. Early bunch-rot often resembles and may be confused with the decay of unpollinated bunches.

In the majority of cases the rot originates in the apex of the spine, which is a prolongation of the side-branch on which the fruits are borne (fig. 1), and travels downwards in the direction of the main axis of the bunch (fig. 2). When it reaches the point of attachment of a fruit, the base of the fruit becomes involved and the condition known as base-rot of the fruit is established (fig. 3). It follows that in these circumstances, the apical fruit of a side-branch is normally the first to be attacked, and examination of a bunch exhibiting base-rot of the fruit will show that if only a few fruits on any side-branch are affected they are almost without exception the upper ones, and that if only one fruit happens to be concerned it is usually the apical one. Occasionally, the rot starts from the apex of a bract, and then it may be found that the only fruit affected is one in a median position (fig. 4). Fruits which have thus rotted at their base rapidly lose resistance and become liable to secondary infections at the base and at the apex. The secondary infection at the apex gives rise to the condition described as stigma-end-rot.

As the rate at which the rot in a side-branch advances will be dependent on the state of resistance of the tissues, and the extent of its advance on the length of time during which it has been operating, it follows that at any particular moment of observation the symptoms exhibited by different bunches may show a wide range of variation. If the rot sets in at an early stage in the development of a bunch, or if its advance is rapid, the whole length of the side-branch and all the fruits on it may be affected long before the bunch is ripe. Conversely, if the onset of the rot is delayed, or its progress is slow, the bunch may ripen with the loss of only a few apical fruits. Further modifications in the symptoms may arise from the fact that the number of side-branches affected in a bunch may range from one to many.

When, due to early onset or rapid progress, the rot has travelled down the entire length of a side-branch, it begins to involve the tissues of the main axis of the bunch. From this situation it can, by peripheral spread, affect the bases of other side-branches, so that what at first appear to be anomalous cases are frequently found where the rot is travelling in an opposite direction to that normally encountered (fig. 5). By horizontal extension of the peripheral infection, or by penetration into the internal tissues of the main axis, or by the coalescence of centres of rot originating from two or more affected side-branches, the apex of the bunch itself may be cut off from nutrient supplies, and then the condition known as bunch-end-rot arises (fig. 6).



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

Rotted tissue shewn in red.

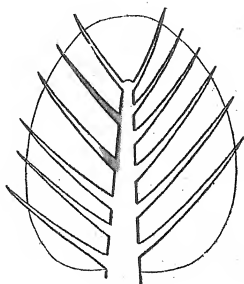


Fig. 5.

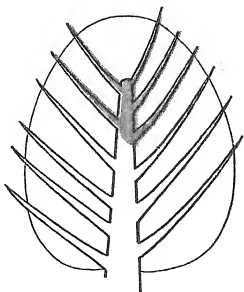


Fig. 6.

Rotted tissue shewn in red.

The condition known as bunch-rot, that is the state in which the entire bunch, or a very large proportion of the bunch is rotted, represents in some instances merely an extreme phase of the conditions already described, but in other cases it is apparent that some additional factor is operating. The conspicuous feature in these cases is the greater uniformity in the symptoms. The rot invariably sets in at a very early stage in the development of the bunch originating in a basal group of unpollinated side-branches situated on the right hand side of the bunch, and from there gradually extends into the main axis. Bunches thus affected always remain small. The fruits on the pollinated portion continue to develop so long as that part of the main axis, from which the side-branches bearing them arise, is not involved in the rot; but as a rule before their development has proceeded very far the entire main axis has decayed.

The additional factor to which reference has been made is therefore incomplete pollination. The constant occurrence of the unpollinated zone on the right hand side of the bunch seems to be due to the fact that the development of the female inflorescence is excentric in relation to the subtending leaf, the excentricity, in those cases which have come under observation, always tending towards the left, in such a manner that the right hand side of the inflorescence becomes shut in by the petiole, making it difficult for the pollen to gain access to the basal flowers.

Etiology of the Rot.

The decay of side-branches bearing unpollinated flowers is inevitable, but the spread of this decay to other parts of the bunch must be regarded in a different light, for experience shows that in normal circumstances its progress would be checked by the resistance of healthy developing tissue, and it is therefore to be supposed that it is only when this resistance is much impaired that the main axis and subsequently the entire bunch is liable to become involved. And, as in this type of rot, so in the types previously discussed, the rot of the fruits and of the bunches is considered to be due to an unchecked extension of natural decay, consequent on a loss of resistance in the affected tissues.

It has already been mentioned that the rot usually originates in the apex of the spine, and occasionally in the apex of the bract. Examination of normal bunches at all stages of development determines the fact that whilst the bulk of the tissue in these two appendages remains healthy, even up to the time the fruits are ripe, the first few millimetres of the apical tissue is always dry and decayed; and it is believed that the rot which spreads down the spine into the side-branch and thence to the main axis is merely the unchecked extension of this normal apical decay.

It will be appreciated that this explanation of the nature of the rot implies that it is due to the operations of saprophytic organisms, and is not a specific disease caused by a specific pathogen. The study of the organisms associated with the rot provides justification for this view.

Organisms Associated with the Rot.

Microscopical examination of tissue derived from the margin of the rot, in the spine, side-branches and main axis, has demonstrated that bacteria and nematodes are consistently present in this situation, the former in large numbers.

The constant occurrence of an organism in the margin or advance of a rot is evidence of its direct connection with the production of this condition. When at least two kinds of organism occur it will be agreed that either one invariably follows the other; that is, is secondary, or that both are equally concerned. If in this case the nematode were the primary organism; were in other words a parasite capable of advancing into healthy tissue, it should be found occurring in areas free from bacterial infection. But as such a state of affairs has not been observed it is to be assumed that this organism is a saprophyte.

To determine the rôle of the bacteria and the possibility of the presence of other organisms not observed in the sections, cultures were set up with tissue derived from the margin of the rot in various situations. From the thirty isolations thus made, five organisms were obtained in pure culture; a fungus and four species of bacteria. Study of the fungus isolation on various media has determined that it is a species of *Fusarium* belonging to the section *Martiella*. As a result of the examination of the morphology, tinctorial characteristics and physiological reactions of the bacterial isolations, these have been identified as:

1. A species of *Bacillus* belonging to the *B. mesentericus* group. This is a group of saprophytic organisms which includes forms occurring in the soil, in the intestines of herbivorous animals, and in decaying vegetable matter, and which is largely concerned in the breakdown of pectin and hemicelluloses.
2. A species of *Flavobacterium* resembling *F. diffusum*, a soil organism.
- 3 and 4. Two species of *Achromobacter* (a genus represented by forms found mostly in soil and water) which were readily distinguished from each other by certain physiological reactions.

The five organisms appeared in the original isolations in the following proportions:

Organism.	Percentage of cultures.
<i>Flavobacterium</i> sp.	40.
<i>Achromobacter</i> sp. (a).	40.
<i>Bacillus</i> (<i>mesentericus</i>).	30.
<i>Fusarium</i> sp.	12.
<i>Achromobacter</i> sp. (b).	10.

A species of *Gloeosporium* was isolated from the base of base-rotted fruits and from the apex of fruits exhibiting stigma-end-rot, but as this fungus was not once recovered from the margin of the rot, its presence in these situations must be held to be due to a secondary infection.

Pathogenicity of the Organisms.

In order to test the pathogenicity of the five organisms isolated from the margin of the rot they were inoculated in triplicate into the spines of developing bunches on oil palms at the Central Experiment Station, Serdang. Pure cultures were introduced into incisions made under aseptic conditions and each inoculated spine was subsequently bound with tape. A control inoculation was established for each of the five sets. Inoculated spines representative of each set were removed and examined at intervals of twenty days, five weeks, and two months after inoculation. The controls were removed at the same time as the last series of inoculated spines. Comparison of the inoculated spines with the controls showed that there was no significant difference in the amount of decay that had occurred, which in no case had advanced for more than a few millimetres into the tissue surrounding the incision. Furthermore, it was found that this decay had made no more progress in two months than it had made in twenty days. It may therefore be accepted that not one of the five organisms is capable of invading healthy oil palm tissue. They are saprophytes whose association with the occurrence of fruit-rot is to be interpreted as evidence that the resistance of the tissues of the affected bunches had been lowered prior to their attack.

Resistance and Nutrition.

The study of the organisms associated with the rot thus tends to confirm the opinion, derived from consideration of its course, that it is merely an abnormal extension of natural decay due to a loss of resistance in the affected tissues. If this view is correct, then it is of fundamental importance to determine the cause of this decline in resistance.

Resistance of this nature, that is, the normal resistance of functioning tissue to infection by saprophytic organisms, is a state whose existence is dependent on the vigour of the plant, or, more precisely, on the vigour of its protoplasm. The maintenance of this vigour is itself dependent on the maintenance of normal metabolism; so that a decline in resistance implies the existence of factors which are responsible for metabolic or nutritional disturbances.

Effect of a Nutritional Disturbance.

If the invasion of the bunch tissues by saprophytic organisms is dependent on a decline in resistance, which is itself consequent on a disturbance of normal metabolism, it follows that it should be possible to induce the rot artificially by a suitable nutritional disturbance.

It was to be supposed that such a disturbance would supervene if the nutrient supply which reaches the bunch by way of the peduncle were severely dislocated. To effect this dislocation it would only be necessary to kill a sufficiently large area of tissue in the peduncle. In order to accomplish this, a 0.5 per cent. aqueous solution of mercuric chloride was injected by means of a syringe into $\frac{1}{8}$ inch holes drilled in the bases of the peduncles of three developing fruit

bunches. The use of mercuric chloride presented certain advantages. In the first place it is highly toxic to all living tissue and could be relied upon not only to kill all the cells with which it came into contact but to inhibit a rapid invasion of the wound by saprophytes. Furthermore, the fact that it tends to form insoluble compounds with protoplasm and simple proteins would prevent its translocation and thus localise its effect. At the time of treatment, two of the bunches were in an early stage of development, the third was almost fully formed. The fruits on all were black and unripe.

The bunches were first examined thirteen days after injection. The two youngest appeared unaffected. The third bunch had begun to change colour and several fruits borne at the apices of the side-branches were loose or had fallen and were found to be rotted at the base. This bunch was removed from the palm and dissected seven days later. Its condition was typical of that exhibited by bunches affected with base-rot of the fruit. Most of the apical fruits of the side-branches had rotted and fallen, although the bunch was not yet fully ripe. Examination of the course of the rot showed that it had originated in the apex of the spine and travelled downwards, involving the bases of the fruits in its path. Some decay had set in at the base of the peduncle, where it had been wounded and injected, but a large expanse of healthy tissue separated this from the decay in the side-branches, leaving no doubt that the latter had been induced, not directly, but indirectly by the disturbance at the base of the peduncle.

The two bunches which had been injected when immature were kept under observation for two months without any development of fruit-rot being observed. As the peduncles were themselves in an active state of growth at the time of treatment it was considered that the effect of the injections had possibly been neutralised by the elaboration of compensating vascular tissue. Each bunch was therefore injected for a second time. Cases of base-rot of the fruit were observed nine days later on both bunches, which were still black and unripe. One bunch was removed and dissected. The rot was found to have progressed in the typical manner, that is, down the spine, or bract, and thence into the base of the fruit. The disintegration of the peduncular tissue resulting from the injections was definitely localised and separated from the rot in the spines by an extent of healthy tissue covering the entire length of the bunch.

The experiment showed, therefore, that typical fruit-rot may be induced by dislocation of the nutrient supply and confirms the opinion that palms so affected have been predisposed to the attacks of saprophytic organisms by a nutritional disturbance.

Cause of the Nutritional Disturbance.

A nutritional disturbance of this kind, which is not due to infection of the tissues by a parasitic organism, must be the outcome of some adverse environmental condition. The normal type of Deli palm can be grown on Malayan soils without being subject to severe outbreaks of fruit-rot, although isolated cases of base-rot and of bunch-end-rot are occasionally encountered. Both the outbreaks of fruit-rot which have been investigated occurred on palms

which were representatives of high-yielding strains. So whatever may be the nature of the adverse environmental factor, it would appear to become operative only when high-yielding strains are cultivated. Such a correlation suggests that the predisposing nutritional disturbance is the result of a soil deficiency.

If this interpretation is correct, then the incidence of the rot will be influenced by artificial pollination, providing that this practice tends to increase the number of developing fruits. When the soil is already deficient the effect of artificial pollination will be to aggravate the shortage and intensify the outbreak. If, however, the deficiency is merely potential, artificial pollination may then become the factor which induces the deficiency and the disease.

The proof of these hypotheses is a matter for experiment. Suitable experiments are in progress.

Recommendations.

Artificial Pollination.—Until there is evidence that, under any particular Malayan conditions, certain high-yielding strains of palms are capable of bringing to maturity their full crops of naturally-pollinated bunches, artificial pollination should not be practised. But if such conditions appears to exist and it is proposed to initiate a programme of artificial pollination, it must be borne in mind that this practice may itself induce fruit-rot.

Manurial Treatment.—If fruit-rot is primarily a deficiency disease then it is clear that some form of manurial treatment is called for. But it is not possible in the present state of knowledge to make any specific recommendation.

Removal of Rotting Bunches.—The extent of the benefit to be derived from the removal and burial of rotting bunches is open to question. Were the operation performed early enough, a useless translocation of nutrients would be prevented. But it is doubtful whether such treatment would do much to reduce the prevalence of the associated saprophytes, in view of their normal abundance.

Rotten Fruit and the Factory.—Rotten fruit must be regarded as a total loss and should not be permitted to enter the factory, otherwise the acidity of the oil will be increased.

Summary.

1. A rot affecting the fruit-bunches of certain high-yielding strains of the oil palm has recently become prominent.
2. The rot may assume various forms. Four main types are distinguished. These are shown to have a common origin.
3. Study of the organisms associated with the rot, and of its course within the bunch, has led to the conclusion that it is caused by a saprophytic invasion of tissues which have been predisposed to attack by a decline in resistance.
4. This decline in resistance is held to be due to a nutritional disturbance.
5. A typical form of the rot has been induced by an artificial dislocation of the nutrient supply.
6. It is suggested that the predisposing nutritional disturbance is brought about by a soil deficiency, and it is considered that this deficiency may be either aggravated or induced by artificial pollination.

CONTROL OF INSECT PESTS IN STORED DERRIS

BY

N. C. E. MILLER,
Assistant Entomologist.

In Malaya, dried *Derris* root is liable to damage by several species of beetles* in both the larval and adult stages. The adult beetles will attack the root a few days after harvesting, but it is more attractive to them after a longer period when the moisture content is low.

The adult beetles lay their eggs in cracks and irregularities on the outside of the root, and the larvae on hatching, bore into the internal tissues and gradually reduce them to powder. On attaining the adult stage (the period from egg to adult being approximately nine weeks) the beetles remain in the root for a short time, then bore a way out and fly off.

Infestation, unfortunately, is not always apparent, since it is only the adults which eject frass from their tunnels; thus it is necessary to take samples of root and split them to be able to ascertain whether larvae or adults of the beetles are present.

Frequently, however, beetles which have laid their eggs on root, also bore into it and in doing so, betray their presence both by the holes they gnaw and also by the frass which they scatter from the tunnels. The presence of frass is generally an indication that the damage is extensive, and that immediate steps must be taken, if complete destruction of the root is to be arrested.

Unless the store is provided with windows covered with wire gauze of 1 mm. mesh, and with doors that fit perfectly so as to leave no crevices through which adult beetles may gain entrance, the protection of *Derris* root against infestation by beetles is almost impossible, in view of the fact that it is a common practice to accumulate stocks of root until the quantity is sufficient to justify export.

It is highly important that the store be kept clear of odd pieces of root, remaining after the packing of former consignments, since such pieces provide material in which the beetles can breed and eventually spread to fresh stocks.

The question of re-infestation of *Derris* in transit on board ship is a difficult one, but if roots are carefully graded and all portions of more than about half an inch in diameter are rejected, the danger of infestation will be greatly minimised. It may be mentioned that such roots so rejected have little toxic value.

Complete elimination from infestation can be secured if the root is ground to powder and packed in sealed tins, but for this purpose a special type of mill is essential, since, during grinding, the cogs of the wheels are inclined to become clogged and need frequent cleaning.

* *Sinoxylon anale* Lesne., *Xylopsocus capucinus* F., *Dinoderus minutus* F. (these are the most important) *Sinoxylon rugicauda* Lesne., *Sinoxylon malaccanum* Lesne., *Dinoderus bifoveolatus* Woll., *Xylotrips flavipes* Illig., *Perissus latus* Lameere, *Pterolophia melanura* Pasc., *Minthea rugicollis* F., *Hypothenemus eruditus* Westw. and *Alphitobius laevigatus* F. These species have been fully dealt with in the "Coleopterous Pests of Stored *Derris*", Dept. Agric. Scien. Ser. No. 14, 1934.

Another method which has been found effective in preventing infestation is to cut the dried root into pieces of about 2 inches in length which are then packed in a plywood chest of the kind used for the export of tea or rubber.

A chest measuring 19 x 19 x 24 inches will hold about 100 lbs. of dried root. This method of dealing with *Derris* root has been practised with satisfactory results by one local firm.

Root treated in this manner should be dried, either in the sun or in a hot-air dryer, chopped and packed expeditiously, and if any root is left over, this also should be packed temporarily, to protect it from infestation until an opportunity occurs to include it in a further consignment.

If on examination of a stock of root, it is found that beetle borers are present, and that the damage is not so far advanced as to render the root worthless, the following methods for the destruction of the beetles and their larvae are recommended.

One method which has been found effective, in killing larvae, pupae, and adults, is to remove the root from the store and expose it for about 5 hours to bright sunshine. More rapid results will be obtained if the root can be spread on iron sheeting, or on a cement floor. Since this method is both cheap and effective, its occasional adoption, especially if no store is available in which stocks can be adequately protected, will possibly obviate considerable monetary loss.

During periods of wet weather, or when the sky is overcast, and consequently there is insufficient sunlight to be effective, it will be necessary to fumigate the root. For this purpose, an air-tight fumigatorium, or a room which is sufficiently air-tight to ensure the minimum escape of vapour, is essential.

The chemical recommended for fumigation is carbon bisulphide, a somewhat expensive substance, but it has satisfactory penetrating qualities and is not difficult to handle.

It should be emphasised, however, that great care must be taken not to inhale it, and also to keep it away from fire since it volatilises rapidly on exposure to the air and forms a vapour which is highly inflammable and explosive when mixed with a certain proportion of air. Another property of carbon bisulphide is that it is heavier than air. It should, therefore, be applied at the top of a pile of root, preferably being sprayed on cloth or sacking.

The quantity recommended for use in fumigation is 2 to 3 pounds per 1000 cubic feet, the amount depending, to some extent, on the amount of root to be fumigated and the degree to which air can be excluded from the chamber.

Fumigation with carbon bisulphide, to be effective, should be extended over a period of 72 hours.

Subjecting infested root to heat, without scorching, for three days is also a satisfactory method of destroying beetle borers, and if a crop of *Derris* is being grown on a rubber plantation, it will be found convenient to use the smoke-house for this purpose.

A DISEASE OF THE DURIAN TREE

BY

A. THOMPSON,
Government Mycologist.

Introduction.

The durian tree (*Durio zibethinus*) which is indigenous to the Malay Peninsula and Netherlands India is looked upon as one of the most valuable and desirable trees in the somewhat mixed collection of fruit trees grown in the Malay small holdings, since the fruit, which has a unique flavour, is always readily saleable in the local markets and in addition, is valued for its tonic food value.

There are no former records of any serious diseases of the durian tree in Malaya, probably due to the fact that the cultivation of the tree is confined mainly to the small holdings from which deaths are not readily reported.

Recently, however, a disease which has been identified as claret-coloured bark canker (or patch canker), has appeared on an estate in Penang where there is a comparatively large area devoted to the cultivation of this fruit.

The Disease.

The disease resembles claret-coloured bark canker of the rubber tree in that there is, at first, no external indication of the presence of a fungus in the tissues of the bark until a dark liquid begins to exude from one or more spots on the trunk, sometimes near or at the collar. Boring beetles soon attack the bark at these spots and bore into the stem. Healthy cortical tissue of the durian tree is pinkish in colour but, when it is attacked by the disease, areas of a darker, dull-red colour, bounded by an irregular margin, are formed and these extend in as far as the wood of the stem.

The disease was reported in May 1934, and has not yet been studied in detail, but from information received from the grower of the affected trees, it appears probable that the disease does not kill a tree quickly, but that the canker spots in the bark gradually increase in size and may coalesce until a considerable portion of the bark is killed and becomes riddled with boring beetles. Finally, the branches die back owing to dislocation of the food supplies and the tree dies. A tree may not die until more than a year after infection has occurred.

The disease appears to have been present in this locality during the past ten years and has annually killed a number of trees. In the area examined, a fair number of trees were found to be infected.

The Cause of the Disease.

The fungus *Phytophthora palmivora* Butl. was isolated from the cortex of a diseased tree and when inoculated into a healthy tree, reproduced the

first symptoms of the disease within seven days. The fungus was again isolated from the inoculated bark, thus establishing that this fungus is the cause of the disease.

The fungus has already been recorded as a cause of a similar disease of the rubber tree; other species of the same genus and a species of *Pythium* (*P. complectens*), have been found to attack rubber trees in Malaya.*

Pythium complectens has recently been observed to attack the collar of rubber trees which have been affected by lightning†, but in the case of the disease of the durian tree there was no indication of lightning injury and the fungus *Phytophthora palmivora* is undoubtedly a primary parasite, capable of directly attacking this tree.

Phytophthora spp. are only virulent in wet or damp weather, since they only produce the active motile spores—known as zoospores—in the presence of water. These zoospores are the principal agents in the spread of infection. During dry weather, the mycelium of the fungus in the bark of affected trees may cease to extend in the tissues and if dry weather continues for a prolonged period, the diseased bark may scale off, leaving a canker on the stem.

It is probable that rapid extension of the disease in the cortex occurs mainly during wet weather and that, during intervening spells of dry weather, the growth of the mycelium is slight, so that the disease does not kill a tree quickly under normal weather conditions. When the disease is situated at the collar, or if it extends to the collar, the probability of its more rapid extension is greater owing to the moister environment at soil level.

The Importance of the Disease.

The presence of an infectious and fatal disease in a perennial crop is a matter for concern, particularly in the case of valuable trees which take some years to reach maturity.

Phytophthora palmivora is, furthermore, likely to spread from a diseased tree to other economic crops in the vicinity. A strain of the fungus is the cause of coconut bud-rot in India and certain other countries, but, so far, this disease has not been recorded on the coconut palm in Malaya. Black stripe and patch canker are, however, two diseases which may appear in rubber trees growing near infected durian trees, and it is also probable that durian trees may become infected if these diseases are present in neighbouring rubber trees.

Treatment of the Disease.

The only feasible method of treating this disease is excision of the diseased bark. It is recommended that the bark should be scraped until the extent of the diseased patch is determined. The affected bark should then be isolated by cuts extending to the wood; the diseased bark should be removed and burnt

* Thompson, A. *Phytophthora* species in Malaya. *Malayan Agricultural Journal*, 17: 53—100. 1929.

† Sharples, A. Lightning Storms and their Significance in Relation to Diseases of (1) *Cocos nucifera* and (2) *Hevea brasiliensis*. *Ann. Appl. Biol.* 20: 1—22. 1933.

and the wound painted with a weak solution of a disinfectant such as 2 per cent. Izal, finally covered with tar, or with a mixture of melted asphalt (60 parts) and kerosene oil, or solar oil (40 parts).

Treatment is difficult if the disease is in an advanced stage; consequently, growers are advised to inspect the trees periodically, particularly if any of the durian trees in the neighbourhood have died from a disease showing the symptoms described above.

Summary.

1. A disease of the durian tree is described.
 2. The disease, which is similar to the disease of rubber trees known as claret-coloured bark canker or patch canker, is caused by the fungus *Phytophthora palmivora*.
 3. It is considered that the fungus is likely to spread to rubber trees from adjoining, diseased durian trees and *vice-versa*.
 4. Recommendations for treating the disease are given.
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CONDITIONS ON SMALL RUBBER HOLDINGS IN MALAYA

2nd Quarter, 1934.

*Prepared by the Economic Branch of the Department of Agriculture,
S.S. and F.M.S. in collaboration with the Field Branch of the Department.*

Rainfall.

In Kedah April was wet. In early May also the rainfall was considerable, but that of June was below average. In the Northern Circle of Johore, April and May were generally dry, except for some very heavy showers. During June although the rainfall was low it was more evenly distributed. In the Southern Circle, April and May were wet months while in June drier conditions prevailed in most districts. At Mersing the rainfall throughout the quarter was sparse. In Selangor, April was wet, but May normal. In June the weather was wet in the inland districts and dry on the Coast. In Perak, the total rainfall was heavier than usual, except on the coastal flat land in Lower Perak. In April and June the rainfall was heavier than usual whilst in May it was generally below the average for the month.

Prices.

The report of an international agreement for the restriction of rubber production and the announcement that it would be brought into force on 1st June, resulted in a quick rise in the price of the commodity. As will be seen from the accompanying Table I, there was in most States a considerable difference between the highest and lowest prices paid in April and May, due partly to rising prices and also, no doubt, to a certain amount of speculation on the part of buyers. Prices varied within narrower limits in June when the situation became clearer and the Singapore price appeared more stable.

The average Singapore prices of standard smoked sheet in cents per lb. were as follows:—April 18.75, May 21.35, June 21.82, while the Singapore prices at the end of each month in dollars (Straits) per picul (133½ lbs.) for small-holders' rubber were as follows: April: smoked sheet \$25.50, unsmoked sheet \$23.50, scrap \$9.50. May: smoked sheet \$16 to \$24, unsmoked sheet \$12 to \$31.50, scrap \$2.50 to \$16. June: smoked sheet \$26, unsmoked sheet \$22—\$23.50, scrap \$11.

It will be noticed that with the advent of restriction, scrap rubber became unsaleable in almost every district, the issue of coupons in most cases being sufficient to cover only the production of sheet.

Most small dealers preferred to purchase wet rubber, as, being covered by coupons, it enabled them to accumulate coupons in excess of the dry rubber held by them. It is suggested that many dealers at port have thus obtained coupons in excess of rubber held by them to the extent of 8 per cent.

Table I.
Lowest and Highest Rubber Prices Paid by Local Rubber Dealers.
(In Straits dollars per picul (133 1/3 lbs.))

2nd Quarter 1934.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
Smoked sheet Unsmoked sheet Scrap	21.00-25.50	19.70-25.00	APRIL 20.00-26.00 17.00-24.00 6.00-11.00	19.50-25.15	18.00-30.00	23.00-30.00	20.00-28.00	19.00-24.00
	20.50-24.50	17.00-24.00		17.20-23.00	14.00-23.20	20.00-28.00	17.00-24.00	16.00-28.50*
	5.00-11.00	5.00-11.00		4.00-11.00	4.00-11.50	5.00-14.00	8.00-15.00	3.00-10.00
Smoked sheet Unsmoked sheet Scrap	23.00-32.00	18.00-31.50	MAY 20.00-31.00 19.00-28.00 4.00-16.00	13.00-32.35	13.50-31.70	18.00-32.00	21.00-28.00	20.00-33.00
	20.00-31.50	14.50-28.00		12.00-31.00	11.00-29.00	18.00-26.00	18.00-25.00	16.00-29.00
	4.00-15.00	4.00-14.75		3.00-14.00	3.00-15.00	4.00-16.00	8.00-14.00	2.00-12.00
Smoked sheet Unsmoked sheet Scrap	24.00-25.00	21.00-26.50	JUNE 22.00-27.40 20.00-24.00 4.00-7.00	22.50-27.00	18.00-27.00	24.00-26.00	22.00-26.50	20.00-26.50
	22.00-24.00	20.00-25.50		20.00-25.00	16.00-25.00	22.00-25.00	18.00-24.00	15.00-25.00
	10.00-15.00	Unsaleable		Unsaleable	Unsaleable	Unsaleable	10.00-15.00	3.00-8.50

*\$28.50 in one centre only. The average highest price was about \$22.00

Table I shows the lowest and highest prices at which rubber was purchased by dealers in each State. Such figures are apt to be misleading, as the highest or lowest price may refer to but isolated purchases. Table II, which shows the mean of lowest and highest prices paid, is a more certain indication of the range of prices which obtained during the period under review.

A trade has already started in the sale of coupons. It was reported from Selangor, for instance, that small-holders sold their coupons without rubber to dealers at \$11 to \$12 per picul, and rubber without coupons at a price of \$10 to \$12 per picul, where the price offered for rubber with coupons was \$27 per picul.

Tapping.

In many parts of the country during the period of rising prices and in anticipation of the introduction of restriction, tapping was severe on small holdings, the owners wishing to take advantage of the more favourable prices ruling. The period following the announcement of restriction and prior to it coming into operation, was one of some uncertainty and there was, therefore, some easing-off of the severity of tapping. From the beginning of June there was some decline in the area tapped and an improvement in the tapping generally, as the owners realised that they were able to obtain sufficient rubber to cover their coupon issue without recourse to drastic systems of tapping. It is reported from Kedah that heavy rains interfered with tapping at one period, but that afterwards heavy tapping was general. Johore reports that the high price of rubber resulted in the production of rubber from many tappable trees which had previously never been tapped.

Areas out of Tapping.

The method of estimating the area untapped on small holdings by means of counting the number of such holdings along the sides of main roads, and applying the percentage thus obtained to the total area of small holdings in the area, was repeated in June. It should be remarked that this method, while not claiming great accuracy, provides a useful index figure of the variations of the amount of tapping on such holdings.

The results of the present survey are stated in Table III, from which it will be seen that in all States covered by the survey, there was a tendency to reduce the area tapped.

The total area of tappable rubber on estates of less than 100 acres which was untapped in the Federated Malay States at the end of June, 1934, is estimated on the foregoing system to amount to about 54,600 acres, as compared with 34,950 acres at the end of March. The total area untapped in the Straits Settlements at the end of June was 18,800 acres as compared with 9,900 acres at the end of March.

Table III.
Estimated Acreage of Tappable Rubber which was out of Tapping on Holdings of less than 100 Acres, at the end of June, 1934.

PERAK					SELANGOR					NEGRI SEMBILAN					PAHANG				
District	Total Tappable area	Total untapped area	Percentage		District	Total Tappable area	Total untapped area	Percentage		District	Total Tappable area	Total untapped area	Percentage		District	Total Tappable area	Total untapped area	Percentage	
Batang Padang	37,288	1,500	4		Klang	18,870	2,100	11		Seremban	19,241	1,900	10		Raub	7,361	1,000	13	
Kinta	34,180	1,400	4		Kuala Langat	20,263	1,200	5		Tampin	17,947	3,200	18		Kuala Lipis	15,951	300	2	
Kuala Kangsar	43,485	5,200	12		Ulu Langat	38,867	1,900	5		Kuala Pilah	17,470	3,800	22		Bentong	13,600	4,000	31	
Upper Perak	13,774	1,500	11		Ulu Selangor	30,632	1,800	6		Jekebu	6,270	800	13		Other Districts	31,223	4,500	14†	
Larut & Selama	51,407	3,600	7		Kuala Lumpur	21,174	4,000	13		Fort Dickson	10,653	1,100	10						
Krian	9,751	5,600	58		Kuala Selangor	9,379													
Lower Perak	47,937	4,800	10‡																
	237,822	23,600	10			148,194	11,000	10			71,581	10,800	15			68,135	9,800	14	
MALACCA					PENANG & P. WELLESLEY					SINGAPORE									
District	Total Tappable area	Total untapped area	Percentage		District	Total Tappable area	Total untapped area	Percentage		District	Total Tappable area	Total untapped area	Percentage						
Central	17,687	500	3		North	3,241	300	10		Singapore	12,781	1,000	8		The percentage of areas out of tapping in March, 1934, was as follows:—Perak 7, Selangor 5, the Negri Sembilan 8, Pahang 9, Malacca 9, Penang and Province Wellesley 5, Singapore 8.				
Alor Gajah	31,387	6,000	19		Central	8,067	1,300	19											
Jaain	24,971	4,000	16		South	8,146	4,900	68											
					Dindings	7,279	800	7											
					Penang	11,114									† Estimated from mean percentage for remainder of State.				
	74,045	10,000	14			36,850	7,300	20			12,781	1,000	8						

Condition of Holdings.

There was a very marked improvement in the condition of small holdings in all States. Clearing of undergrowth and the general cleaning up of holdings was general. It is stated that this was not due only to the improved financial position of the owners, but in many cases to the belief that a reduction will be made in coupon issue under the rubber regulation scheme in the case of holdings that are overgrown.

No serious cases of soil erosion have been reported during the quarter.

Diseases.

In Kedah, bark diseases became evident in old infected holdings with the advent of wet weather and the usual methods were adopted for their control. The distribution of a fungicide by the Department was continued in three Districts.

Johore reports state that the dry spell experienced during the first two months of the quarter was instrumental in effecting an improvement in the condition obtaining in the badly-infected area in the Northern Circle. The easing of the economic position of the small-holder, coupled with the advent of rubber regulation, led to an increased use of disinfectants in most areas. The fear that the assessment rate for small holdings will depend to some extent on the absence of disease, led many small-holders to take more energetic measures to check mouldy rot disease in their holdings. The outbreak of oidium disease in several districts reported during the previous quarter, diminished in intensity early in the present quarter and infected areas rapidly recovered. Several cases of pink disease were found in the Kluang District; treatment and control measures were undertaken early and the attack was confined to a few trees only. Only a few cases of root disease were reported and these were effectively controlled.

Mouldy rot disease was well under control in most areas in Selangor. In Perak this remains the only disease of any importance. Increased control measures were taken by the owners, greater use being taken of the facilities provided by the Department for the supply of approved fungicides for its treatment. No reports of *oidium heveae* were reported.

Grades of Rubber.

Considerable variations of importance have been noted in the grades of rubber purchased by dealers as is shewn by the following figures.

Kedah.—The percentage amount of smoked sheet declined in all districts by about 20 per cent., while unsmoked sheet increased to a similar extent. In Alor Star the average percentages were:—smoked sheet 70, unsmoked sheet 16, scrap 14; Sungei Patani—smoked sheet 34, unsmoked 57, scrap 9; Baling—smoked 23, unsmoked 66, scrap 11; Kulim—smoked 29, unsmoked 32, scrap 39 (scrap decreased, while smoked shewed an increase during the quarter).

Johore.—The percentage of the different grades of rubber sold, varied enormously as between Districts. In Batu Pahat and Benut over 70 per cent. was smoked sheet, most of the remainder being unsmoked sheet; in Tangkak, Muar, Segamat, Kluang, Senggarang and Johore Bahru the average was: smoked 46, unsmoked 45, scrap 9; while at Panchor, Pontian and Kota Tinggi purchases were almost entirely of unsmoked sheet.

Selangor.—Smoked sheets were still being prepared in the Coastal Districts, while in the inland Districts both smoked and unsmoked were prepared. Improvement in quality of smoked sheet was reported in one District.

Perak.—In Perak North, only in Taiping was any considerable amount of smoked sheet purchased (37 per cent.). In 7 other centres the purchases averaged 72 per cent. unsmoked and 18 per cent. scrap. In Perak South, with the exception of Tanjong Malim (74 smoked, 16 unsmoked, 10 scrap) the percentage purchases at 3 centres were: smoked 18, unsmoked 70, scrap 12. In the Krian District percentage purchases were smoked 10, unsmoked 60, scrap and lump 30: Selama sub-District smoked 80, unsmoked 20. In Kuala Kangsar the percentages were smoked 41, unsmoked 21, scrap 38.

It will be noted that the above figures do not reflect the cessation of purchase of scrap and very low-grade rubber which was a feature of the June market.

General.

No cases of budding of rubber or of new planting have been brought to notice during the quarter. Furthermore, owing to the more favourable price of rubber, there was no evidence of abandonment of rubber holdings in favour of other forms of cultivation.

The position of the small-holder has considerably improved, but the full effects of the improvement will not be apparent until next quarter when his debts to Government for land rent will have been liquidated and the increased cash return from the sale of rubber can be devoted to his own needs.

The quality of rubber marketed tends to improve, not only on account of the lack of demand for scrap but by reason of a growing appreciation of the fact that higher grades command higher prices. It is reported, for instance, that the import of rubber-mangles has increased in Kelantan where they are purchased by the small-holders or hired for the purpose of preparing a better grade product.

Miscellaneous Article.

MALAYAN GRADED PINEAPPLES.

A commercial consignment of pineapples graded in accordance with the provisional grading standards drawn up by the Department of Agriculture, S.S. and F.M.S., was packed at a canning factory in Singapore during February 1934. The consignment consisted of 87 cases, comprising 25 cases of Golden Cubes, 25 cases of G.A.Q. Cubes, 25 cases of Golden Slices (spiral cut) and 12 cases G.A.Q. Slices (spiral cut). Fruit was dear and scarce at the time of packing. The consignment was inspected by the Agricultural Field Officer, Singapore, before despatch and passed as conforming with the grading standards. It was despatched to the Agent, Malayan Information Agency, early in March 1934. All cases and tins were clearly marked to show their grade and the consignment was accompanied by a grading certificate.

It should be emphasised that the consignment was packed by the factory and was only inspected by the Agricultural Field Officer, Singapore, to ensure that it conformed with the grading standards. The standards achieved, therefore, should be capable of attainment in any factory, provided that a supply of fruit of average size and ripeness is obtainable. The consignment thus represented a definite practical commercial experiment, although it was considered to represent the upward limit of the respective grades.

The Agent, Malayan Information Agency, was requested to bring this consignment to the notice of the trade and to effect a sale thereof on behalf of the Department of Agriculture.

The cost of the consignment was—

87 cases at \$3.67	...	\$319.29
Freight and Shipping Charges	...	94.74
		<hr/>
		\$414.03

The consignment was sold at an all round rate of 2s. 9d. per dozen tins or 11s. per case, delivery and labelling at buyers' charge. The market price of the day was 2s. 10d. per dozen, labelled and delivered. The price of 2s. 9d. was considered to be equivalent to 3s. 1d. labelled and delivered, so that it represented 3d. more than the price of the day, a margin stated by the trade to be considerable.

Th actual sum realised for the sale of this consignment was :

87 cases at 11s. = 957s., equivalent to \$410.14.

The average sale price per case, after deducting shipping and handling charges was \$3.62. In considering the price realised, allowance must be made for the fact that the consignment was small, so that the grading charges were pro-

portionately higher than those on a large consignment and that the price obtained was an average for all grades.

In connexion with the sale of the consignment, the Agent, Malayan Information Agency, writes—

"There is no 'market' for pines in the sense that there is for many commodities. By this I mean that there is no central place where pineapples are examined and then bid for in the same way, *e.g.* as there is for wool.

"All pineapples are sold by private treaty between the merchant and either the broker or the distributor and it is therefore impossible to obtain competitive bids for a small consignment from people with a long established connexion either with a particular canner or a particular shipper."

He further points out that in practice, the labelling is haphazard and unsystematically done so that the ultimate purchaser has, in very many cases, no idea that there are different qualities. The result is that there is only a very slight difference between the prices of different grades and the premium on the better quality is almost negligible.

In order to arrive at the opinion of the trade on the quality of this consignment, the Agent invited 25 merchants, dealers and distributors to inspect samples and to write their opinion for his confidential information. Moreover, Mr. Banner, Mr. Graham and himself, all being officers of the Agency, made detailed inspections of two sets of samples.

In sampling the consignment, the Agent noticed that there was a very large sedimentary deposit when the syrup was allowed to stand for a few minutes in a glass. Consequently, the syrup was analysed with the following satisfactory result—

" (1) Golden Slices	Sugar 16.91 per cent.
(2) Golden Cubes	16.42 do.
(3) G.A.Q. Slices	16.43 do.
(4) G.A.Q. Cubes	16.94 do.

"The above figures are for total sugars expressed as sucrose in the syrup.

"The sediment is essentially similar in each can and consists of vegetable tissue from the fruit, together with a number of crystals or raphides of crystallised calcium oxalate. The formation of such crystals is fairly common in pineapple products. The sediment is quite free from metals."

The results of the detailed inspection of the two sets of samples by the officers of the Agency may be summarised as follows. Details are given in the Appendix.

- G.A.Q. Cubes.* Sample 1. "Below G.A.Q. average".
 Sample 2. "Cubes uniform in size, fair colour, can be classified as good".
- G.A.Q. Slices.* Sample 1. "Taking all together is an improvement on present G.A.Q.".
 Sample 2. "Fair sample of G.A.Q.".
- Golden Cubes.* Sample 1. "Up to standard of average Golden but not superior".
 Sample 2. "As a whole under colour, fruit firm and uniform".
- Golden Slices.* "Fair Golden".

The examination revealed considerable differences in the contents of the different tins.

There was considerable variation in the opinions expressed by the representatives of the trade as a result of their examination of the samples. The following extracts illustrate this—

- (a) "The GOLDEN quality were perfect of their kind and if it could be arranged that all shipments of the G.A.Q. quality Cubes were up to the standard submitted, there could not be any cause for complaint by either the trade or the consumer. We feel sure that if this standard could be maintained and guaranteed, the article would command higher prices than have ruled for some considerable time.
 "The G.A.Q. Slices were inferior to the standard required and such quality would do harm to the trade."
- (b) "We would suggest that if you ship only Golden quality and G.A.Q. quality equal to the samples which we inspected the business would be put on a very much firmer basis."
- (c) "I criticised the quality of the G.A.Q. and made them below current standards. Those since inspected at my request by apparently turned out better."
- (d) " $1\frac{1}{2}$ Tall Golden Slices. The sample tins which I saw at your office were in my opinion, a very good delivery for this grade, the fruit being of good colour and texture. The workmanship was good, and if deliveries could be kept up to this standard, I consider that they would meet with a good reception.
 " $1\frac{1}{2}$ Cubes. Here again, the colour and texture were good, but a little more careful workmanship could be shown in the cutting of the cubes. Some of the edges of the cubes were ragged, and if this could be avoided, I think this packing would be entirely satisfactory to this market.
 " $1\frac{1}{2}$ Tall G.A.Q. Slices. I was very impressed with the quality of this particular package. If deliveries could be made of a quality similar to that which I saw, I think it probable that the demand could be increased."

"1½ Tall Cubes. I should say that your samples were about average. Undoubtedly there is room for improvement, and although there were no white, hard, unripe cubes in the tins I saw, I consider that the colour was a little too pale to please the average dealer."

- (e) "We should be very pleased and I think that most other importers of pines would also be very pleased, if their deliveries came in accordance with the samples which I saw opened. I should class both the Golden Cubes and the Slices and the G.A.Q. Cubes and Slices as wonderful deliveries of the grades, in fact, we have had deliveries of Golden fruit, only very slightly superior to the G.A.Q. which you opened. I do not remember ever having seen a tin of either Cubes or Slices, G.A.Q., as regularly packed, and as evenly yellow, and as regular in cutting as the tins that were opened. You could assure any shipper on the other side that, if they could make deliveries of grades, such as the samples which you opened, they would never have the slightest complaint on this side. "In regard to your enquiry as to whether we think an improvement in the grading would cause a better price to be obtained from the Pines, I think that it would, but I think that there should be a marked difference in the grading of the three grades, and I would suggest that in order to endeavour to capture a percentage of the trade done in the South African and Australian round-cut slices, more attention is given to the packing of Golden round-cut slices, and that it might even be advantageous not to pack any spiral cut slices in the Golden grade."
- (f) "However, I think that, even in accordance with the grading rules, the sample of the G.A.Q. Pines is higher than that called for by the rules, and I should very much doubt if canners generally could keep up to this standard, unless they had other markets for disposal of the slightly lower grade, of which I should imagine they would have an accumulation.

On the subject of syrup two views were expressed —

- (a) "The specification that you have submitted to us is quite all right with the exception that we believe the sugar content is different from that which is now being used by the packers. The present sugar content is quite all right for the trade because ripe pineapples are naturally a sweet fruit and there is no necessity for a heavy syrup."
- (b) "In regard to the suggested grading, it appears to be reasonable, but I think that the syrup should be heavier in the Golden Grade than in the G.A.Q., and still heavier than in the Seconds. At the present moment, the percentage of sugar by weight, appears to be about 10 per cent. I think at least 17 per cent. should be the percentage for Golden, higher would be advantageous, about 10 per cent. for the G.A.Q., and rather under this for the Seconds."

The opinions expressed in these letters also show, as stated in the Agent's letter, that —

"There is a general consensus of opinion that what is required in the first instance is the complete elimination from the shipments to the United Kingdom of the 2nd. Grade product, and that strenuous efforts should be made to effect this as soon as possible.

"On the general question of grading there is less unanimity, but there is a widespread view that the G.A.Q. must be kept to a higher average standard than that of current shipments."

Appendix.

GRADED.

G.A.Q. Cubes.

(1)	25 Pieces.	Clean cut poor colour as a whole pass as 2nd.	9 $\frac{1}{4}$ oz.
(2)	29 Pieces.	17 good, 12 poor.	Fair 9 $\frac{1}{2}$ "
(3)	26 "	riper pine	Good 10 "
(4)	26 "	8 poor colour	Generally good 10 "
(5)	22 "	8 poor colour	Fair to good 9 $\frac{1}{2}$ "

Golden Cubes.

(1)	26 Pieces	)	Up to standard of	10 $\frac{1}{2}$ "
(2)	23 "	)	average Golden but	10 "
(3)	23 "	)	not superior	10 "

G.A.Q. Slices.

(1)	10 Slices.	Eyes not properly cut away	12 $\frac{1}{2}$ "
		5 poor, 5 average	
(2)	10 "	1 piece definitely overripe imparting sour	13 $\frac{1}{2}$ "
		smell to tin: 2 pieces poor colour	
		7 quite good	
(3)	10 "	1 poor, otherwise good	12 $\frac{1}{2}$ "
Taking all together is an improvement on present G.A.Q.			

Golden Slices.

(1)	10 Slices.	Similar to (3) G.A.Q. deep cut	12 $\frac{1}{2}$ "
(2)	10 "	4 poor Fair Golden	13 $\frac{1}{2}$ "
(3)	10 "	2 poor Fair Golden	13 "

2nd. SAMPLES.

G.A.Q. Cubes.

- | | | | |
|-----|------------|---|-------|
| (1) | 22 Pieces. | Not uniform in size; 7 poor, 1 broken | 9 oz. |
| (2) | 27 " | Too light in colour; unripe; 12 worse than rest | 10 " |
| (3) | 22 " | 4 poor, better than (1) and (2) | 9½ " |
| (4) | 24 " | A really good tin: 2 too light in colour | 10 " |
- Cubes uniform in size—colour fair; can be classified as good.

Golden Cubes.

- | | | | |
|-----|------------|--|------|
| (1) | 22 Pieces. | Fairly uniform, 1 broken, 2 light colour | 10 " |
| | | Generally too light. | |
| (2) | 23 " | Colour similar to (1) | 10 " |
| | | 7 poor—white spots and seeds | |
| (3) | 21 " | 3 broken, 3 spots, similar colour | 9¾ " |
| (4) | 23 " | 1 very spotty, 5 light colour | 10 " |
- As a whole under-coloured. Fruit firm and uniform.

G.A.Q. Slices.

- | | | | |
|-----|-----------|---|-------|
| (1) | 10 Slices | 1 brown—overripe: 5 light, 5 medium light in colour | 13 " |
| (2) | 10 " | All patchy, colour lacking | 11¾ " |
| (3) | 10 " | Colour better 2 light white spots and seed marks | 12½ " |
| (4) | 10 " | Colour more uniform; many blemishes | 13½ " |
- Fair sample of G.A.Q.

F. W. S.

Reviews.

Modern Coffee Planting.

By E. G. Windle. 220 pp. London: John Bale, Sons, & Danielsson Ltd., 83-91, Great Titchfield Street, W. 1. 1933. Price 11 shillings.

This book is essentially a practical guide to coffee planting, and being written in a popular style, will appeal more to the planter than to the scientist.

Although the book deals exclusively with the cultivation of Arabica coffee in the hills of Southern India, more particularly around the districts of Mysore, it contains much valuable information which may be successfully applied to the cultivation of other varieties of coffee on the plains, or Arabica coffee on the hills in Malaya.

After brief mention of the origin of coffee and the importance of the Arabica variety as the most valuable for hill cultivation, the author describes, in considerable detail, the various operations connected with the opening up of a coffee estate. Chapters III to VI deal with the laying down of nurseries, felling and clearing, method of planting the crop in the field, digging of pits to prevent soil wash, and finally, the establishment and control of shade trees.

The upkeep of the estate is dealt with in Chapters VII to XI, which treat at some length, such operations as weeding, topping, manuring, pruning and digging, while Chapter XII is devoted to methods of harvesting the crop and the preparation of the beans for market.

The question of control of diseases and pests is fully discussed in Chapters XIV to XVIII and the effect of spraying the bushes with either Bordeaux or Burgundy mixtures for the control of leaf disease is strongly emphasized.

Finally, in Chapter XX attention is drawn to good quality in coffee. It is stated that, although soil and climate have a considerable influence on quality, for a good outturn (a) good season, (b) coffee picked when fully ripe, and (c) good cultivation are required. It has been found in India that beans having the highest specific gravity invariably realised the highest prices. Further, the colour of the bean influences its market value and, on the home markets, East India is expected to be "coloury" coffee of a good, dark green colour. Apparently, different colour standards apply to various types of beans produced in other countries.

Since the author has had a long and wide experience as a practical planter of coffee and other crops under conditions obtaining in Southern India, the information contained in this publication should not be lightly valued.

The book undoubtedly contains a vast amount of information on the subject and should prove most useful to those planters wishing to improve their knowledge of coffee cultivation as practised in South India.

B. B.

The Culture and Marketing of Tea.

By C. R. Harler, 384 pages and index; 8 illustrations and
Humphrey Milford. Oxford University Press, London, 1933.
Price 12 shillings and 6 pence.



The author of this book, having completed fourteen years as a scientific worker at the Experimental Station at Tocklai, Assam, records the experience gained while connected with the tea industry in North-East India. Although chiefly concerned with tea-growing in that part of Asia, Dr. Harler has visited other important tea-producing countries and includes a descriptive account of the industry in Ceylon, Java and Japan. The book serves as a valuable introduction to the subject both from the scientific and practical aspect and is recommended to those interested in tea cultivation in Malaya.

The subject is dealt with in four parts. The first part describes the tea plant and its habitat and gives a general account of cultivation and manufacture. The botanical nomenclature of the tea plant agreed to is *Thea sinensis* (L) Sims. This name was used by Linnaeus in 1753 for the Chinese bush and employed by Sims in 1807 to include all varieties then known under one species. Adopting the classification of Cohen Stuart, varieties are confined to four groups based on leaf characters, height of the tree and original habitat.

The importance of vegetative propagation is stressed in connexion with selection. Crown grafting, budding, and upright stem layering have been employed with success in Java. Recent investigations in that country and Malaya, however, show that etiolation is a ready method of vegetative propagation.

Climatic and soil conditions are dealt with in separate chapters. Whilst the range of soil reaction tolerated by tea is a wide one, extending from pH 4 to neutrality, successful tea soils in North-East India usually show pH values between 5.4 and 6, i.e. are on the acid side.

Part II deals with the chemistry and pharmacology of tea which is of particular interest in connexion with manufacture.

The third part describes the methods practised in the most important tea-producing countries with special reference to North-East India. Two chapters are devoted to China and Japan, including Formosa. The Chinese methods are traditional and have been changed little by science, but both in Japan and Formosa modern machine processes are in use. A chapter on tea-tasting and terms used in describing teas is useful for reference when dealing with tea samples. The tea industries in Ceylon and in Java are described briefly in separate chapters.

The last part consists of two chapters summarizing production and consumption, and describes the tea markets of the world. Reference is made to the restriction scheme in force whereby the export of tea from producing countries is regulated and further planting held in abeyance. The scheme is to remain in operation in some form for five years and has already resulted in a very beneficial effect on tea prices.

J. N. M.

Departmental.

FROM THE DISTRICTS.

July 1934.

*Compiled by the Chief Field Officer from Monthly
Reports submitted by Field Officers.*

The Weather.

During the early part of the month, weather conditions were universally dry. Towards the middle and end of the period heavy rains were experienced in Kedah bringing the monthly precipitation substantially above the average. Late rains in the coastal areas of western Johore caused a slight increase over the average, while in all other States, and the inland districts of Johore, the monthly rainfall was considerably below normal, with the exception of Malacca and the northern areas of Province Wellesley.

Remarks on Crops.

Rubber.—A substantial rise in price is reported from all centres, an increase of up to \$6.00 per picul being recorded from Pahang South.

The regulation of production and incidence of padi planting have materially decreased the output. Moderation of tapping systems and improvement in sanitation is general. In the northern areas of Johore, however, tapping continues to be heavy in the Districts of Muar and Batu Pahat, though reports indicate that the tapping rate tends to decline and is only moderate at Segamat.

Unfavourable weather conditions tended to check the distribution and spread of mouldy rot disease. The voluntary control of this disease continues to be satisfactory, and extended sales of approved fungicides have been reported, more particularly from Negri Sembilan, where 336 gallons were disposed of to small rubber-holders. This disease, introduced undoubtedly from the mainland, was reported from Langkawai for the first time.

Padi.—In Province Wellesley south, central Perak, the coastal areas of Malacca and parts of Pahang, dry weather conditions delayed cultivation and nursery establishment. As a result of this setback some 200 acres at Padang Kampar in Pahang will not be cultivated during the current season. In most other centres, however, the planting programme is well advanced.

Large quantities of bones have been imported into Malacca from Kedah, Perak and Selangor for use as a fertiliser, at prices ranging from \$2.50 to \$4.50 per picul, depending upon size. A depot for the sale of Perlis phosphate has been opened by the firm working the Bukit Ketu deposits.

An aggregate of several thousand acres of dry padi interplanted among coconuts between Muar and Batu Pahat in Johore is now in ear, and a good crop is anticipated.

Coconuts.—Further progress in improved methods of copra production is reported from Province Wellesley, Pahang East and Johore, where extensions in the number of good types of kilns suitable for small holdings have been noted. A further consignment of copra from the State-aided kiln at Sri Menanti, Johore, averaged \$2.92 per picul, while \$3.15 was realised by a small holding manufacturer in Province Wellesley.

As a result of low prices ruling for copra, the possibilities of a profitable inland export of nuts from the coastal areas of Muar in Johore are now being investigated.

Tobacco.—New plantings aggregating 60 acres were reported from Kedah, while extensions to existing areas have been undertaken in Johore, and in the Raub District of Pahang, which maintains an appreciable export to Kuala Lumpur.

Tea.—In Malacca, Chinese small-holders are evincing much interest in this crop, and extensions to the planted areas have been undertaken at Machap and Sungei Petai.

Fruit.—The mid-season fruit crop was, on the whole, very poor. In Kedah, durians and mangosteens were in fair supply. In Negri Sembilan, these fruits, although not plentiful throughout the State, supported a considerable export trade to Singapore, more particularly from the sub-district of Rembau. In Perak the durian and mangosteen crops from Selama were poor, but moderate supplies of the former fruit were available at Bukit Gantang and Batu Kurau in Larut, at Kuala Kangsar, and also in the vicinity of Tapah and Tanjong Malim. Prices realised were fairly high and ranged from \$7 to \$9 per 100 at the beginning of the month. Selected durians from Batu Kurau realised from cents 15 to 25 each. The season in Malacca was extremely poor, mangosteens being a complete failure.

Agricultural Stations.

The total yield of green leaf harvested during the month at the Tanah Rata Experiment Station was 10,302 pounds, from which 1,992 pounds of made tea were manufactured. A break of 72 half chests was despatched to London during the month. Further progress was made in extending the areas under tea and coffee at this Station, while a site was selected and laid out to test the possibility of establishing lucerne by the application of fertilisers and the provision of shade.

At the Singapore Pineapple Station, fruiting continued throughout the month, returns falling off appreciably towards the end of the period. Experimental work on fertilising was continued. A crop of 428 pounds of green leaf of Deli and Jaffna varieties of tobacco was harvested and cured.

Satisfactory progress has been maintained at the stations under development at Kilanas in Brunei and Bukit Kallam in Labuan.

Padi Stations and Test Plots.

Favourable weather conditions enabled good progress to be made with cultural operations at the Telok Chengai Station in Kedah. Nurseries were manured and sown with local and improved selections. The distribution of selected seed to different districts was completed during the month.

In Krian cultural operations were well advanced and nurseries sown at Titi Serong Station; work on padi test plots has made good progress including the development of a new plot in the mukim of Bagan Serai. Dry conditions throughout the District caused some anxiety during the early part of the month; broken weather during the last week, however, materially eased the situation.

In other centres work is well in hand, and where established, crops look promising.

Felling operations were completed on 24 acres of the reserve for a padi station at Sungei Manik, and further progress has been made in connexion with the opening up of test plots at Tanjong Karang, Panchang Bedina and Sungei Haji Dinani in the Kuala Selangor District of Selangor.

Poultry.

Outbreaks of disease were reported from Sungei Bakau and Kuala Kurau in Krian District and from Selama town. Each case was investigated by a veterinary officer who attributed the outbreaks at Sungei Bakau and Selama to Diptheritic Stomato-pharyngitis.

An outbreak of fowl pox at Renglet was confirmed by a Veterinary Inspector from Kampar who gave advice regarding treatment.

The outbreak reported from Penggerang in Johore last month is now abating. Heavy losses have been sustained.

Rural Lecture Caravan.

The Rural Lecture Caravan was on tour in Perak during the month and visited nine centres in the Kuala Kangsar, Kinta and Lower Perak Districts. Instruction was mainly confined to mouldy rot disease control and poultry husbandry, except at Sitiawan, where lectures on improved methods of copra production were included. A satisfactory amount of interest was shown in the slides and exhibits demonstrating the subjects upon which concentration was focussed. The films as usual attracted large audiences.

Small-Holders Rubber Advisory Service.

In accordance with the recommendations of the Rubber Research Institute Commission of Enquiry that a service of Asiatic Instructors should be organised for instructional work in small rubber holdings, an approved scheme was inaugurated during the month, and nine officers, including eight Malays and one Indian, were posted for duty in Kedah, Negri Sembilan, Perak, Selangor, Johore and Pahang.

Instructors are recruited by and paid from Rubber Research Institute funds, and at the completion of their training are attached to the staffs of the State and divisional agricultural officers, who issue the necessary instructions and supervise and plan their work, in accordance with general lines drawn up by the Director of Agriculture, and the Director, Rubber Research Institute.

In most centres these officers have already accomplished useful work in obtaining information relating to small holdings, delivering lectures on improved methods of manufacture, and organising demonstrations on matters requiring improvement.

*Note :—*Local prices of various commodities are now published under Market Prices.

DEPARTMENTAL NOTES.

Death of Inche' Embi bin Hassan.

The death of Inche Embi bin Hassan, Notice Server, Taiping, which occurred in the early morning of 1st August, 1934, is recorded with deep regret.

Inche Embi joined the Department on 15th October, 1924, and has thus had just under ten years service, the whole of which has been spent in Taiping.

The staff in Taiping and other departmental officers who knew him wish to record their deep sympathy with his widowed mother in her bereavement.

Leave of Director of Agriculture.

Dr. H. A. Tempamy, C.B.E., Director of Agriculture, S.S. and F.M.S., has been granted 7 months and 22 days full pay leave from 11th July 1934 to 4th March 1935 inclusive.

Mr. F. W. South, Chief Field Officer, has been appointed Acting Director of Agriculture during Dr. Tempamy's absence on leave.

Pineapple Industry Legislation.

The Director of Agriculture and the Chief Field Officer attended a meeting at Singapore on 6th July, of the Committee appointed to recommend to Government regulations for the registration of factories and making of cans under the Pineapple Industry Ordinances and Enactments.

The question of a grading scheme was also discussed with Government officials and representatives of the industry.

Visits of the Director of Agriculture.

The Acting Director of Agriculture inspected various agricultural stations in Selangor on 25th and 26th July. He also paid official visits to Negri Sembilan and Malacca on 30th and 31st July, for the purpose of inspecting Agricultural Stations and Padi Test Plots.

Agricultural Advisory Committee.

A meeting of the Agricultural Advisory Committee was held at the Department of Agriculture, Kuala Lumpur, on 14th June 1934. A number of important subjects were discussed and the position regarding several lines of work passed under review. Amongst the more important subjects which engaged the attention of the Committee were the following:—Provision of funds for research work on pineapple canning; grading of pineapples and pineapple legislation; suggestions for the relief of the coconut industry; development of the rice industry; improvement of poultry in small holdings.

Leave.

Mr. H. J. Simpson, Agricultural Field Officer, returned from leave on 6th July 1934, and has assumed duty as acting State Agricultural Officer, Pahang.

Staff Change.

Mr. A. E. Coleman-Doscas, State Agricultural Officer, Negri Sembilan has been appointed to act as Chief Field Officer from 11th July 1934.

Statistical.

MARKET PRICES.

July, 1934.

Rubber.—The price of rubber continued its upward trend during July, improving from 22½ cents per lb. for spot loose in Singapore to 23½ cents per lb. at the close. The average price for the month in Singapore of Smoked Sheet, equal to London Standard was 23.53 cents per lb. as compared with 21.82 cents per lb. in June. In London the average price in July was 7.03 pence per lb. and in New York 14.51 cents gold per lb. as compared with 6.46 pence and 13.36 cents gold respectively in June.

Weekly prices paid during July for small-holders' rubber at three centres are shown in Table II.

Palm Oil.—The market rallied slightly during July and its course is shown in the following table of the Malayan commodity: basis 5 per cent. f.f.a.

Table I.

DATE 1934.	PALM OIL			KERNELS
	L'Pool/Holland/ Hamburg c. i. f. landed weights in bulk per ton £. s. d.	L'Pool/Continent c. i. f. per ton net in barrels £. s. d.	Halifax (Nova Scotia) c. i. f. landed weights per lb. Cents gold.	Fair Average Malayan Quality c. i. f. Landed Weight per ton on Continent. £. s. d.
July 4	9 5 0	11 15 0	—	5 17 6
" 11	9 5 0	11 15 0	—	6 2 6
" 18	9 7 6	11 10 0	—	6 2 6
" 25	9 15 0	11 15 0	2.20	6 2 6

Copra.—There was practically no change in the copra market in Singapore during July, the price for the sun-dried grade opening and closing at \$2.95 per picul after touching \$3.05. Shipments from the East as a whole for the first four months of the year show an increase of some 30,000 tons compared with 1933, so that the prospect of a sustained price advance seems remote. The average price for the month was \$2.95 as compared with \$2.93 in June. The mixed quality averaged \$2.49 per picul as compared with \$2.51 in the previous month.

Copra cake improved slightly to \$1.10 per picul and rose further at the end of the month to \$1.20.

Rice.—The average wholesale prices of rice per picul during June were as follows:—Siam No. 2 (ordinary) \$2.66, Rangoon No. 1 \$2.50, Saigon No. 1 (long grain) \$2.60 as compared with \$2.60, \$2.42 and \$2.50 respectively in May. Corresponding prices in June 1933, were \$3.83 and \$3.04 for Siam No. 2 and Rangoon No. 1 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in June were:—Singapore 21, Penang 25, Malacca 23, as compared with 23, 25 and 23 respectively in May.

The average declared trade value of imports of rice in June was \$2.93 per picul as compared with \$3 in April and \$3.10 in May of this year.

Padi.—The price paid for padi at the Government Rice Mill, Bagan Serai, remained at \$1.25 per picul while a private mill continued to pay \$1.30 per picul.

In Kedah the price rose steadily and reached the equivalent of \$1.25 to \$1.40 per picul by the end of the month. In Province Wellesley the price range was \$1.37 to \$1.50 per picul and elsewhere there was little change, the price varying from 5½ to 12 cents per gantang.

Tea.—The London price quoted for Malayan tea during June was 1s. 0½d. For the same month, average London prices per lb. for tea consignments from other countries were as follows:—Ceylon 1s. 1.49d., Java 11.17d., Indian Northern 1s. 1.03d., Indian Southern 1s. 1.20d., Sumatra 10.89d. Prices of all grades declined during the month.

Tuba Root (Derris).—A much firmer tone prevails for roots sold on the basis of ether extract, the average Singapore price for July being \$34.50 per picul, an advance of \$4. Roots sold on rotenone content remained steady at the previous month's average of \$40 per picul.

Coffee.—The Singapore price of coffee improved slightly during July. Sourabaya coffee rose from a range of \$19 to \$21 per picul according to grade to \$19.75 to \$21.50, closing, however, at \$19 to \$21. Palembang coffee remained steady at \$13 per picul with a short rise during the month to \$13.50. The average for the month was \$13.12 as compared with \$12.85 in June.

Local prices for coffee beans have ranged from \$12 to \$38 per picul in various parts of the country.

Arecanuts.—Average prices per picul in Singapore during July were as follow:—Splits \$2.79 to \$4.19; Bila Whole \$2.44; Sliced \$11.62 to \$13.62; Red Whole \$4.12 to \$5.62; Sourabaya Whole \$5.12 to \$6.50; Kelantan Whole \$3.25 to \$3.59, the price within each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best \$4.06, Medium \$3.75, Mixed \$3.10.

Gambier.—Singapore prices varied little during July, Block remaining steady at \$4 per picul as against an average of \$4.05 in June and No. 1 Cube improving slightly to close at \$7.50 per picul, with an average of \$7.38 as compared with \$7.30 in June.

Pineapples.—Prices advanced appreciably during the month on rather better demand in London and on reports of a falling off in the fruit crop, but at the end of the month, business was virtually at a standstill as buyers would not pay the higher prices. Average prices per case for July were as follows:—Cubes \$3.19, Sliced Flat \$3.15, Sliced Tall \$3.35 as compared with \$3.01, \$3 and \$3.12 respectively in June.

Prices for fresh fruits in Johore were:—First quality \$2.40—\$2.60, second quality \$1.60—\$1.70, third quality 90 cents to \$1.50 per hundred. Prices in Singapore were \$2.50 and \$1.50 per hundred for first and second quality fruits. In Selangor prices ranged from 60 cents to \$2 per hundred for large fruit.

Tapioca.—Prices in Singapore were lower during July but remained steady with the exception of a slight decline in Flake Fair at the end of the month. Average prices per picul were: Flake Fair \$3.94, Pearl Seed \$5.75, Pearl Medium \$6 as compared with June averages of \$4.33, \$5.86 and \$6.20 respectively.

Sago.—As usual the tapioca market was reflected in this commodity. Average prices per picul in Singapore were Pearl, Small Fair, \$3.84 and Flour, Sarawak Fair \$1.85 as against \$3.84 and \$1.85 in June.

Mace.—There was no change in the Singapore market for mace during the month. Prices remained steady at \$70 per picul for Siouw and \$50 per picul for Amboina as in June.

Nutmegs.—Prices in Singapore improved slightly during July, averaging \$23.25 per picul for 110's and \$24.25 per picul for 80's as compared with \$22.50 and \$23.50 respectively for June.

Pepper.—Prices eased off still further during July, the weight of stocks in England and America tending to depress the market, but firmed appreciably (especially White) at the close of the month on renewed enquiry from Europe. Average prices per picul in Singapore were:—Singapore Black \$13.31, Singapore White \$31.63, Muntok White \$32.12 as compared with June average prices of \$14.85, \$33.60 and \$3.40 respectively.

Cloves.—Singapore prices continued nominal at Zanzibar \$35 and Amboina \$45 per picul.

Tobacco.—Prices of sun-dried leaves have ranged from \$7 to \$50 per picul according to quality, in most parts of the country. The range in Kelantan was from \$40 to \$60, and in Johore from \$30 to \$75.

Table II.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, July, 1934.
(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.		Batu Pahat Johore.			
	5	12	19	26	4	11	4	11	18	25
Smoked sheet		28.96	27.00	28.00						
Unsmoked sheet	25.06	26.00	26.71	26.51			23.00	24.00	25.00	25.00
Rubber*					24.00	25.55				
Scrap	15.00									

* Wet unsmoked sheet.

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$3.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent. No purchases at Kuala Kangsar on the 18th and 25th July.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

June 1934.

Malaya.—The imports into Malaya of foreign rice during June were 46,687 tons and exports 11,550 tons, net imports accordingly being 35,137 tons. The net imports for the period January to June 1934, were 221,292 tons, an increase of 10.3 per cent. over the corresponding six months of 1933.

Of the imports during June, 45 per cent. were consigned to Singapore, 15 per cent. to Penang, 6 per cent. to Malacca, 24 per cent. to the Federated Malay States and 10 per cent. to the Unfederated Malay States. Of the total, 69 per cent. came from Siam, 29 per cent. from Burma, 1 per cent. from French Indo-China and 1 per cent. from other countries. Of the exports during June, 69 per cent. were shipped to Netherlands India and 31 per cent. to other countries.

The various kinds of rice exported were :—Siam 6,891 tons (59.7 per cent.), Burma 4,064 tons (35.2 per cent.), Indo-China 381 tons (3.3 per cent.), India 42 tons (.3 per cent.), local production 172 tons (1.5 per cent.).

India and Burma.—Foreign exports for the period January to April, 1934, were 586,000, a decrease of 19.1 per cent. as compared with the exports for the same period of 1933, which were 724,000 tons.

The total exports of rice and bran from Burma for the period 1st January to 31st May, 1934, were 2,000,439 metric tons, as compared with 1,716,470 metric tons for the corresponding period of 1933, an increase of 16.5 per cent.

Siam.—The exports of rice from Bangkok in May were 169,367 tons; total exports for the first five months of 1934, were 748,195 tons as compared with 707,675 tons during the corresponding period in 1933.

Japan.—Formosa. According to the first estimate of the first rice crop of 1934, the area planted amounted to 712,750 acres, an increase of 5,160 acres or .7 per cent. as compared with the corresponding crop of 1933. Production is estimated at 603,600 tons, an increase of 51,200 tons, or 9 per cent., as compared with the actual results recorded for the same crop of 1933.

French Indo-China.—A report on the Saigon Rice Market for June, 1934, states that during the first fortnight, prices of padi fell as a result of the general fall in the price of rice. Arrivals from the interior were normal. During the second half of the month, prices rose with the rise in price of rice. It is probable that the renewed activity in the rice market will obviate a dangerous increase in stocks at Cholon.

Rice prices fell steadily and nearly reached the lowest level of the year owing to the threatened imposition of a quota on Indochinese rice importations into France in addition to an import tax of 10 francs per quintal. Better news from France and a number of orders from India caused a recovery in the second half of the month. Broken :—Prices fell away markedly early in the month but recovered slightly and closed on a fairly firm note, owing to low stocks.

*Abridged from the Rice Summary for June, 1934, compiled by the Department of Statistics, S.S. and F.M.S.

Netherlands India.—According to the *Economic Bulletin* dated 1st June, 1934, the area of harvested padi (wet and dry) in Netherlands India during the first quarter of 1934, amounted to 1,450,631 acres as compared with 1,174,979 acres in the corresponding period of 1933, an increase of 23.5 per cent.

Imports of rice into Netherlands India (*Economic Bulletin* dated 16th June, 1934) during the first quarter of 1934, amounted to 39,353 metric tons as compared with 129,827 metric tons during the first quarter of 1933, a decrease of 69.7 per cent.

Ceylon.—The imports for the first half year of 1934, were 243,009 tons, showing an increase of 10.1 per cent. as compared with the imports of 220,768 tons for the corresponding period of 1933. Of the 1934 imports, 14 per cent. were from British India, 65 per cent. from Burma and 21 per cent. from other countries.

Europe and America.—Shipments from the East to Europe were 701,574 tons for the period 1st January to 28th June, 1934, as compared with 762,397 tons for the corresponding period of 1933, a decrease of 8 per cent.

Of the 1934 shipments, 45 per cent. were from Burma, 3 per cent. from Japan, 40 per cent. from Saigon, 9 per cent. from Siam and 3 per cent. from Bengal. The corresponding percentages for 1933, were 54, 3, 36, 6 and 1 per cent. respectively.

Shipments to the Levant from the East during the period 1st January to 7th June, were 19,055 tons as compared with 16,941 tons for the same period in 1933, an increase of 12.5 per cent.

Shipments to the West Indies and America from the East were 91,079 tons for the period 1st January to 10th June as compared with 65,352 tons during the corresponding period in 1933, an increase of 39.4 per cent.

MALAYAN AGRICULTURAL EXPORTS, JUNE, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-June 1933.	Jan.-June 1934.	June 1934.	June 1934.
Arecanuts ...	20,756	10,613	17,250	1,428	1,999
Coconuts, fresh ...	100,609†	48,794†	45,695	11,129†	7,960†
Coconut oil ...	17,568	9,443	12,583	1,536	1,833
Copra ...	110,543	39,095	44,827	3,344	6,475
Gambier, all kinds ...	2,560	1,217	1,042	177	132
Oil cakes ...	9,992	6,013	6,191	1,231	1,220
Palm kernels ...	1,983	792	1,345	180	203
Palm oil ...	12,101	4,093	6,229	340	1,279
Pineapples, canned ...	59,582	32,674	39,557	8,097	10,043
Rubber ...	459,836§	208,747§	235,446§	39,552§	24,203§
Sago,—flour ...	7,648	1,934	4,246	98	115
„ —pearl ...	2,646	1,049	2,123	163	348
„ —raw ...	4,420*	2,037*	2,899*	393*	499*
Tapioca,—flake ...	9,881	6,008	4,114	896	529
„ —flour ...	702*	141*	1,238*	40	340*
„ —pearl ...	17,297	7,975	7,941	1,023	1,199
Tuba root ...	569½	231	297	49	38

† hundreds in number.

* net imports.

§ production.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS
2nd QUARTER, 1934.

(As declared by Estates)

	Palm Oil		Palm Kernels	
	F. M. S.	Johore	F. M. S.	Johore
April	912.7	169.5	307.5	58.8
May	749.0	154.1	444.0	88.4
June	721.0	116.6	543.0	104.0
Total	2,382.7	440.2	1,294.5	251.2

MALAYA RUBBER STATISTICS

ACREAGES OF TAPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING JUNE, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING		AREAS OF TAPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5) (9)	Percentage of (9) to (2) (10)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,285	1,106	2.5	8,455	19.1	806	1.8	9,561	21.6
Dindings	7,368	112	1.5	974	13.2	109	1.5	1,086	14.7
Malacca	121,152	1,540	1.3	18,857	15.5	3,562	2.9	20,397	16.8
Penang Island	1,366	318	23.3	312	22.8	93	6.8	630	46.1
Singapore Island	28,842	4,831	16.7	4,158	14.4	744	2.6	8,989	31.1
Total S.S.	203,013	7,907	3.9	32,756	16.1	5,314	2.6	40,663	20.0
FEDERATED MALAY STATES :—									
Perak	253,227	4,206	1.7	37,761	14.9	12,325	4.9	41,967	16.6
Selangor	310,003	3,586	1.2	45,264	14.6	12,770	4.1	48,850	15.8
Negri Sembilan	233,592	8,623	3.7	35,773	15.3	19,429	8.3	44,396	19.0
Pahang	46,712	2,385	5.1	11,037	23.6	5,842	12.5	13,422	28.7
Total F.M.S.	843,534	18,800	2.2	129,835	15.4	50,366	6.0	148,635	17.6
UNFEDERATED MALAY STATES :—									
Johore	(c) 325,747	14,906	4.6	25,340	7.8	21,253	6.5	40,246	12.4
Kedah (a) (b)	126,588	12,123	9.6	15,631	12.3	18,048	14.3	27,754	21.9
Kelantan	25,793	5,431	21.1	2,735	10.6	4,147	16.1	8,186	31.7
Trengganu (b)	4,543	Nil	Nil	171	3.8	171	3.8	351	7.7
Perlis (a) (f)	1,181	159	13.5	192	16.2	318	26.9	351	29.7
Total U.M.S.	483,852	32,639	6.7	44,059	9.1	43,937	9.1	76,708	15.8
TOTAL MALAYA	1,530,399	59,346	3.9	206,660	13.5	99,617	6.5	266,006	17.4

Notes:—(a) Rendered quarterly.

(b) Registered Companies only.

(c) Figures are for end December, 1932.

(d) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(e) Figures are as reported by estate managers.

(f) Figures are for end March, 1934.

FOR THE MONTH OF JANUARY, 1934 IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by estates of 100 acres and over during the month		Production by estates of 100 acres and over during the month		Imports		Exports including re-exports				Stocks at end of month				
	Ports	Dealer	Estate area and over	during the month	January to the month inclusive	during the month	January to the month inclusive	during the month		during the month		January to May inclusive 1934		Ports	Dealers	Estate area and over		
								Foreign	From States & Lanun	Foreign	Local	Foreign	Local					
MALAY STATES :-																		
Federated Malay States	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Johore	...	976	3,807	11,292	68,988	1,296	56,703	Nil	Nil	Nil	Nil	12,135	...	95,965	50,344	...	3,193	7,840
Kedah	...	222	976	3,690	22,064	988	26,814	Nil	68	Nil	148	1,248	...	1,036	17,906	...	1,113	2,416
Perlis	...	6	436	2,633	16,372	194	9,279	Nil	Nil	Nil	1,924	1,924	...	8,706	17,893	...	289	1,674
Kelantan	...	Nil	4	83	43	215	...	Nil	Nil	Nil	Nil	...	...	12	1,953	...	30	13
Terengganu	...	61	292	1,352	168	86	650	Nil	319	Nil	67	196	...	554	5,746	...	191	138
...	...	55	50	71	1,304	3	650	Nil	Nil	Nil	Nil	107	...	1,954	...	...	59	90
Total Malay States	...	1,259	5,334	17,936	109,466	3,155	98,140	Nil	68	319	148	14,593	2,926	116,638	118,659	...	6,750	12,131
SEMITERRITORIES :-																		
Malacca	...	551	369	1,381	7,912	445	...	1	Nil	4	Nil	2,721	...	21,594	...	...	1,051	672
Province Wellesley	...	12	144	884	3,462	92	...	Nil	3,314	Nil	107,490	7,741	...	50,356	...	...	136	448
Pendang	...	4,719	14,991	22	109	637	96	14,694	...	3,314	13,340	...	...	...	...	...	2,900	14,890
Penang	3	13	71	15	...	2,591	...	...	195,048	...	...	...	...	...	7,554	55,149
Selangor	...	11,838	58,396	82	189	1,070	18	18,389	...	...	...	...	...	...	...	...	154,472	1,159
Total Straits Settlements	...	16,577	73,181	620	2,576	13,159	536	14,694	20,393	3,214	118,372	107,490	98,742	...	Nil	...	10,544	71,258
TOTAL MALAYA	...	16,577	74,440	5,964	20,512	122	651	172,834	20,393	3,214	118,661	107,638	93,335	2,526	108,659	10,544	78,008	133,498

N.B. - In view of the abnormal situation during the months of May and June, and the combination in this return of exports from local areas with ocean-shippments from + Ocean shippments from Malaya, the accuracy of the figures is in accordance with the footnotes.

* Export of rubber from Malaya, of rubber directly to the F.M.S., during June, 1934.

TABLE IV

DOMESTIC EXPORTS - 4

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE V

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE VI

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE VII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE VIII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE IX

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE X

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XI

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XIII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XIV

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XV

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XVI

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XVII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XVIII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XIX

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XX

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XXI

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XXII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XXIII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XXIV

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XXV

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XXVI

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XXVII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957	10,973	3,069	19	316	129						
TOTAL	5,133	55,149	14,880	1,229	1,113	289						

TABLE XXVIII

FOREIGN EXPORTS

Class of Rubber	Ports		Singapore		Penang		Port Swettenham		Malacca		MALAYA	
	31	32	33	34	35	36	37					
DRY RUBBER	4,716	44,176	11,211	1,210	797	160						
WET RUBBER	957</											

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamers not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula: $\text{Production} + \text{Imports} + \text{Stocks at beginning of month} - \text{Exports} - \text{Stocks at end of month} + \text{Consumption}$, i.e., Columns (6) + Columns (15) + (16) + (19) + (21) + (22) - [(4) + (5) + (6) + (7) + (11) + (12)]. For the Straits Settlements, Columns (9) figures for Singapore and Penang Islands represent sales or exports as compared with the figures for the mainland represent as purchases by dealers from the local estates of less than 100 acres, reduced by 15% to terms of dry rubber.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 35% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Domestic exports represent for Malay States, Province Wellesley, Malacca and Dindings net exports from these territories, and for Singapore and Penang Islands net exports as shown by sea paid.
5. The Federal and State statistics of stocks are taken from the *Year Book of Statistics* for the Federated Malay States, and for Singapore on 28 July, 1934. With certain exceptions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S. at Singapore on 28 July, 1934.

METEOROLOGICAL SUMMARY, MALAYA, JUNE, 1934.

METEOROLOGICAL SUMMARY.																	EARTH TEMPERATURE		RAINFALL					BRIGHT SUNSHINE.			
LOCALITY.		AIR TEMPERATURE IN DEGREES FAHRENHEIT				Absolute Extremes				Means of		At 1 foot		At 4 feet		Total.		Most in a day.		Number of days.					Total.	Daily Mean.	Per cent.
		A and B		Highest		Lowest		Precipitation, 0.1 in or more.												Thunderstorm.		Fog morning obs.		Gale force 8 or more.			
		A.	B.	Min.	Max.	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.	mm.	Precipitation, 0.1 in or more.	Thunderstorm.	Fog morning obs.	Gale force 8 or more.						
Railway Hill, Kuala Lumpur, Selangor	90.2	72.4	81.3	94	70	87	75	84.1	84.9	7.13	181.1	2.72	7.13	181.1	2.72	20	17	5	2	1	158.70	5.29	43				
Bukit Jeram, Selangor	87.5	72.8	80.1	90	69	85	75	83.7	85.8	6.22	158.0	1.58	6.22	158.0	1.58	16	13	3	1	1	205.40	6.85	56				
Sitiawan, Perak	89.6	73.3	81.5	92	71	87	75	84.4	85.2	3.01	76.5	0.64	3.01	76.5	0.64	16	12	1	1	3	209.50	6.98	57				
Temerloh, Pahang	89.3	73.0	81.1	93	71	80	74	84.6	86.1	8.26	209.8	2.06	8.26	209.8	2.06	21	19	3	3	25	170.20	5.67	46				
Kuala Lipis, Pahang	88.4	71.8	80.1	92	70	83	73	84.0	84.9	7.00	177.8	3.43	7.00	177.8	3.43	20	14	2	25		159.80	5.33	43				
Kuala Pahang, Pahang	87.5	73.8	80.7	90	72	83	75	86.7	85.9	2.15	54.6	0.53	2.15	54.6	0.53	9	8	3			216.20	7.21	59				
Mount Faber, Singapore	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
Butterworth, Province Wellesley	87.6	74.4	81.0	90	72	83	77	84.1	84.9	7.45	189.2	1.11	7.45	189.2	1.11	17	14	1			204.10	6.80	55				
Bukit China, Malacca	84.4	73.7	79.1	87	71	82	75	83.1	84.3	8.85	224.8	3.00	8.85	224.8	3.00	21	17	3			170.15	5.67	46				
Kluang, Johore	86.8	70.9	78.9	93	69	76	74	81.4	82.3	11.54	293.1	2.17	11.54	293.1	2.17	26	21	1	8		132.10	4.40	36				
Bukit Lalang, Mersing, Johore	86.8	71.9	79.3	90	70	80	73	82.3	82.3	4.31	109.5	0.76	4.31	109.5	0.76	17	13	3	1		193.40	6.45	52				
Alor Star, Kedah	88.2	74.6	81.4	91	72	82	77	87.0	86.4	5.67	144.0	1.42	5.67	144.0	1.42	17	15	4	1		223.35	7.45	59				
Kota Bharu, Kelantan	89.9	74.0	81.9	93	72	87	76	85.2	85.4	5.93	150.6	2.13	5.93	150.6	2.13	11	8	2			249.10	8.30	67				
Kuala Trengganu, Trengganu HILL STATIONS.	88.9	72.7	80.8	92	70	85	74	83.9	84.9	9.73	247.1	5.04	9.73	247.1	5.04	10	7	1			229.00	7.63	62				
Fraser's Hill, Pahang 4268 ft.	74.5	62.9	68.7	78	62	70	64	71.9	72.3	9.95	252.7	1.62	9.95	252.7	1.62	22	18	5	2		146.50	4.88	40				
Pahang Highlands, Tanah Rata, Pahang 4750 ft.	73.2	57.0	65.1	78	51	70	62	70.2	69.7	8.35	212.1	1.02	8.35	212.1	1.02	21	18				134.25	4.47	36				
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	72.1	59.9	66.0	75	59	69	61			9.27	235.5	1.05	9.27	235.5	1.05	22	17				141.40	4.71	38				

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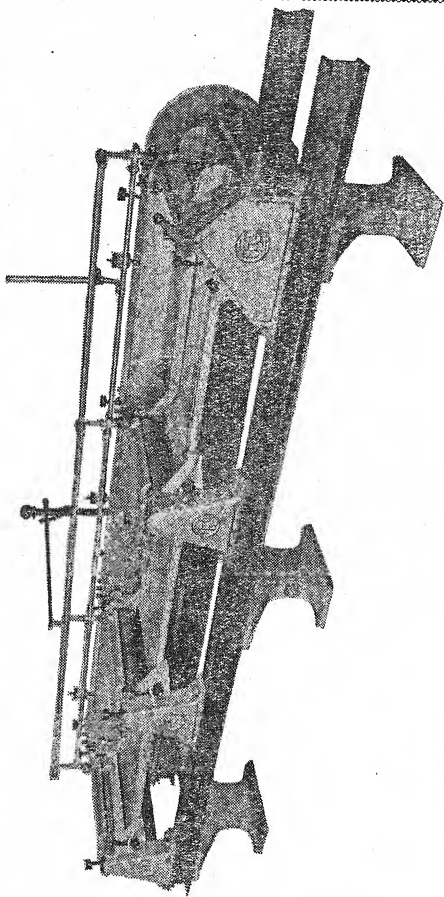
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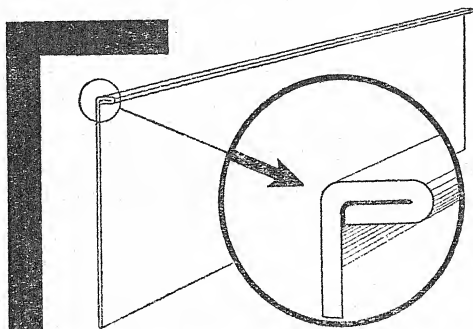
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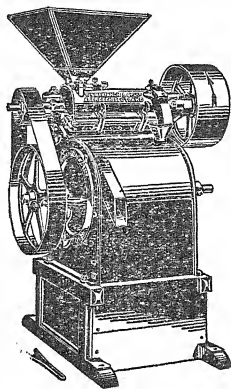
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Malayan Agricultural Journal. Vol. XXII No. 3, March 1934, p. 129.
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for *D. elliptica* Changi No. 2 should be Ney Kee.

year, although volume of production was maintained, the value was much below average.

The Committee deals with the subject in three main portions, *viz.* the coconut industry; the oil palm industry; other vegetable oil industries. The seriousness of the present economic position of the major of these industries is epitomised in the Report in the following words:—

"It will be seen that the present position of all coconut producers is extremely difficult and precarious; it is comparable with that of rubber growers during the rubber slump and deserves very sympathetic treatment."

The Report reviews the general world situation respecting each of the important vegetable oils, deals more fully with the Malayan industry and examines the various means by which the present position might be alleviated and the future welfare assured. The recommendations, therefore, fall naturally into two groups; either they are concerned with temporary relief, or they suggest means whereby the future of the industry may be stabilised. In the former group are, for instance, recommendations for relief in rent, rates, export duties; in the latter are suggestions for improvement of the product, organisation amongst producers, extending markets.

The Report perhaps suffers from the very multiplicity of suggestions for improvements; the application of some will admittedly not go far towards the relief of producers, others may be to the benefit of the producer but to the detriment of the local consumer.

This method of treatment may make it somewhat difficult for the reader to decide upon which points the Committee desires to lay emphasis. It has the advantage, however, of giving the Report a wider appeal, for the points which may be of minor importance in one part of the Empire may possibly prove of greater value in another Colony.

The most important recommendations made concerning the local coconut industry are prohibition of further planting of coconuts, Empire preference and protection, substitution of coconut oil for other imported oils, and the better organisation of the industry. While any temporary alleviation such as may be given by reduction of rent would be much appreciated by producers, we believe that it will contribute but little to recovery without the inauguration of a closer organisation of producers. The Committee suggests the formation of a local branch of the Copra Producers' Organisation, and indicates many lines of investigation which should be the function of such a body. This seems to us a necessary provision if the industry is to expect assistance in any form either from Government or from other important bodies. The industry cannot expect material outside help if it is without organisation, and is unable to voice its opinions or represent its case as a concerted body. The fact seems fairly well established that the local market might absorb a much larger quantity of coconut products, and other markets might be developed if there was a "live" organisation of producers whose duty it would be, not only to protect the interests of coconut producers, but to develop the industry on up-to-date lines.

In relation to the oil palm industry, the Committee has less to say regarding methods of relief. It is of opinion that, owing to its excellent organisation, this industry is probably in a better position to weather the difficult situation than is the coconut industry. Suggestions are made, however, to effect some measure of relief.

Other vegetable oils receive the consideration of the Committee; in particular, groundnuts, gingelly and soya beans. These are of importance to Malaya, not because they are extensively grown locally, but because they are imported in considerable quantities and used for purposes for which locally produced coconut and palm oil might be substituted.

The Committee does not recommend restriction of production of either coconut or oil palm products, but does urge the curtailment of planting of new areas. In view of the fact that it is unlikely that important planting interests will be attracted to coconut planting and that restricted planting is to be allowed to small-holders (who are the most important producers,) it appears to us unlikely that the acceptance of this recommendation will have any material favourable effect on the situation, although it would appear to be advisable to create a safeguard against the possibility of any extensive planting in the next few years. In the case of oil palms a somewhat similar recommendation is made. Here, the small-holder is not concerned—he does not plant oil palms. The Committee suggests that there should be no further alienation of land by Government for oil palm cultivation, but that reserve land already alienated for the crop may be planted up. The total planted area in Malaya is about 64,000 acres, and unplanted reserves 47,000 acres. It is possible, therefore, that the planted area may be increased materially, after which available capital for this form of cultivation would be deviated from Malaya to other suitable countries in which there is no such restriction. It is unlikely, therefore, that restriction of planting will have any material effect on world production.

The report states:

“The immediate outlook for the industries concerned is likely to be extremely difficult for some time to come; there appears to be little likelihood of an early recovery in prices, although in a situation so complex, the possibility of recovery and of expansion in the consumption of certain by-products must not be overlooked. So far as can be seen, however, recovery is more likely to take place by the elimination or reduction of certain sources of supply, while it is within the bounds of possibility that the position may become worse before improvement sets in.

“It is conceivable, however, that some degree of regulation of further planting might be feasible, combined with some system of Imperial and International agreement for the admission on a quota basis of various oils and fats into consuming countries. In any event, it seems probable that only the most efficient and the cheapest producers are likely to survive under present conditions.”

The keynote of future action is contained in the last sentence, and we suggest that readers should examine the report with this warning foremost in their minds.

THE PRESENT ECONOMIC CONDITION OF THE COCONUT AND OTHER OIL-PRODUCING INDUSTRIES.*

The General Situation of the Oils and Fats Industries.

The present disastrous fall in prices is the result of a combination of factors affecting a number of related industries; these factors cover a wide range of geographical and climatic conditions. The products concerned comprise not only coconut, palm and palm kernel oils, but also whale oil, soya bean oil, cotton seed oil, groundnut oil, olive oil and tallow, together with a number of other oils of lesser importance; the production of dairy butter and lard also has an important bearing on the situation.

All these oils are extensively used in the manufacture of margarine, lard substitutes, and cooking and edible oils; they are also employed in the manufacture of soap and toilet preparations, and on the condition of these industries the market for them depends. Moreover, margarine and lard substitutes enter into competition with butter and lard, so that any marked increase of production and corresponding decrease of price in the case of the latter will lead to decreased consumption of the substitute products, because domestic consumers prefer the genuine article provided it is within their means.

Owing to scientific advances it is now frequently possible to substitute one oil for another in manufacturing processes. Consequently, manufacturers have a wide range of choice in their raw materials and are able to take advantage of marked lowering in price of any of the more important vegetable or animal oils and fats by changing their formulae and their purchases to suit market conditions. It is seen, therefore, that the raw materials are closely interconnected, and over-production of any one may seriously affect consumption in any other, or all of the others.

There has been greatly increased production in practically all of these raw materials, and in several there is serious over-production. It seems not improbable that the total surplus may approximate to about one year's normal consumption.

Over-production dates back to the years succeeding the War, when prices for vegetable oils and fats rose to unprecedented figures. Consequently, all branches of the edible oil industry apparently offered attractive openings for capital and great expansion of the areas planted under oil crops therefore followed. Concurrently, increased capital was introduced into certain industries, notably the whaling and the soya bean industries, resulting in greatly increased supplies of these oils being placed on the world's markets.

*The following is an Abstract of the Report of the Vegetable Oil Committee appointed by H.E. The Governor of the Straits Settlements and High Commissioner for the Malay States on 21st April, 1934, and under the Chairmanship of Dr. H. A. Tempany, C.B.E., Director of Agriculture, Federated Malay States and Straits Settlements. The terms of reference were:—"To investigate and report on the present economic condition of the coconut and other vegetable oil-producing industries and to make recommendations."

On the other hand, there has been a steady decline in the consumption of margarine and probably, to a less extent, of soap. This has been accompanied by a steady increase in the production of butter which is now coming on to the world market in large quantities at prices which compete with margarine.

A further factor which has profoundly influenced the situation is general instability coupled with lessened purchasing power.

The present world-wide move towards economic nationalism has also considerably affected the position. As a result of the latter, Governments all over the world are vying with one another in fostering the production of such oils and fats as can be produced within their own boundaries. As a part of the campaign, higher and higher tariff barriers are being erected against foreign produce, quota systems are being introduced and in some cases, complete prohibition of the entry of certain fats has also been effected.

In the British Empire, under the Ottawa agreements and the British Import Duties Act of 1932, coconut, palm oil and kernels obtain a preference varying in different countries, which in the Report are set forth in some detail.

In France, vegetable oil imports are subject to a quota restriction; in Germany the importation of oils and fats is a Government monopoly and the imports allowed were nominally reduced in 1933 to 50 per cent. of imports in 1932. Quota restrictions on the importations of certain vegetable oils, including coconut oil, are also in force in Italy, Spain, Switzerland, Denmark, Czechoslovakia and Austria.

The position in the United States is the most disturbing of all, inasmuch as from 11th May, 1934, a processing tax has been imposed which has the effect of raising the duty by 3 cents a pound on imported foreign coconut and palm oils, the total duty becoming 5 cents per lb. on coconut oil and 3 cents per lb. on palm oil, *i.e.* £22.4.0 per ton on coconut oil and £13.9.0 per ton on palm oil (copra being taxed proportionately to its oil content).

The immediate outlook for the oil-producing industries is likely to be extremely difficult for some time to come; there appears to be little likelihood of an early recovery in prices, although in a situation so complex, the possibility of recovery and of expansion in the consumption of certain by-products must not be overlooked. So far as can be seen, however, recovery is more likely to take place by the elimination or reduction of certain sources of supply; it is also possible that the position may become worse before improvement sets in.

The remedy of artificial restriction of production is obviously inapplicable to the relief of the coconut and palm oil industries. Apart altogether from special difficulties in relation to these industries which would be formidable, if not insuperable, owing to the large proportion of native producers and the geographical distribution of these crops, it would also be necessary for effective control to regulate the output of all related oils and fats. Unless this could be achieved, limitation of production in the case of one or two products would merely lead to increased production of others.

It is conceivable, however, that some degree of regulation of further planting might be feasible, combined with some system of Imperial and International agreement for the admission on a quota basis of various oils and fats into consuming countries. In any event, it seems probable that only the most efficient and the cheapest producers are likely to survive under present conditions.

The Uses of Coconut Oil, Palm Oil and Palm Kernel Oil.

Coconut oil and palm kernel oil are principally used for the manufacture of margarine and soap, while glycerine is an important by-product. In the United States, prior to the imposition of the new processing tax, from 55 to 60 per cent. of the total consumption of these oils entered into soap, 25 to 30 per cent. into margarine and from 10 to 15 per cent. into other food.

Palm oil is used mainly in soap making, but an important addition is its use as a flux in the manufacture of tin plate, for which purpose nearly 7,000 tons were consumed annually in the United States. It is also used to a minor degree in margarine making.

Coconut oil is used in the margarine industry as a principal ingredient of vegetable oil margarine and no other oil which has been tried on a commercial scale has proved as satisfactory in making this type of margarine. In the United States, vegetable oil margarine is practically exclusively manufactured; elsewhere than in the United States, however, vegetable oils used in margarine manufacture have suffered from the severe competition of whale oil since, in Europe, hardened and refined whale oil is a major constituent of margarine.

Whale oil production is now in the region of 350,000 tons per annum. The increase is due primarily to the exploitation of the Antarctic waters and to modern methods of whale catching. Norway produces about half the world supply of whale oil, and Great Britain and British Possessions produce the next largest quantity.

The production of soya bean oil has also greatly increased of recent years and it has become a serious competitor with coconut oil in margarine making in Europe. The chief supplies are derived from Manchuria.

Before the art of refining, deodorising and hardening oils was as well understood as at present, some difficulty was experienced in utilising whale and soya bean oils, but now, taste and smell can be completely removed and a hard fat can be obtained.

The Coconut Industry.

The world acreage under coconuts is not accurately known, but a fairly reliable estimate in 1930 placed the area at about $7\frac{1}{4}$ million acres, as compared with $5\frac{1}{2}$ million acres in 1921. British Empire countries account for slightly more than half the world acreage. Some part of the new acreage has not yet come into bearing, while other areas are not yet in full bearing; hence, the supply of coconut products should tend to increase for some years to come. The bulk of the production is in the hands of small-holders; large coconut estates prob-

ably do not account for more than 10 per cent. of the total. The world production of coconuts, in terms of copra, may be estimated at about 3 million tons. In 1929, the peak year, aggregate exports from producing areas in terms of copra amounted to only 1.7 million tons or under 60 per cent. of the estimated total production. It therefore appears that over 40 per cent. of the total production is consumed in the countries of origin.

The principal products of the industry are copra, coconut oil, fresh nuts, shredded and desiccated coconut together with coconut cake and meal, coir, arrack, toddy and shell by-products. Of these products, copra is, by far, the most important, although in recent years the manufacture of coconut oil in countries of production has increased considerably.

The net exports of copra from the principal producing countries in 1930 were 1,033,000 tons, of which over 401,000 tons were from the British Empire. The net exports of coconut oil in 1933 are estimated at 230,000 tons, of which 70,000 tons were derived from the British Empire.

Of the total world supply of copra in 1930, 35.7 per cent. was from Netherlands India, 15.1 per cent. from the British Southsea Islands, 16.5 per cent. from the Philippine Islands, 9.8 per cent. from Malaya, 8.7 per cent. from Ceylon, and 14.2 per cent. from various other sources. Of coconut oil exports, 73.6 per cent. was from the Philippine Islands, 21.8 per cent. from Ceylon and 4.5 per cent. from Malaya.

Although half the total area of coconuts is in the British Empire, Empire produce only comprises about one-third of the total exports from producing countries. This is due to the fact that India, which possesses the largest area under the crop, now exports no coconut products, and since 1914 has been an importing country.

Distribution of World Supplies among the Consuming Countries.

The principal copra importing countries in 1933 were:—United States of America 295,032 tons, France 196,644 tons, Germany 121,181 tons, United Kingdom 102,095 tons.

Before the War, Germany was the principal importer of copra with France, second. Since the War, however, the United States has been, by far, the largest importer, while the United Kingdom has also largely increased its imports of copra in recent years. In addition to imports of copra for crushing, a number of countries import coconut oil both from copra-producing areas and also from copra-crushing countries outside these areas.

Market Prices for Copra and Coconut Oil.

The price of copra both before the War and in the earlier years of the War was subject to substantial fluctuation; between January, 1911 and July, 1914, the average monthly price c.i.f. London for fair merchantable sundried Singapore copra lay between £21.2.6 and £31.2.9. During the War, prices rose to £45.15.0 in November, 1917. No further change occurred until after the

War, as prices of oil seeds were regulated until March, 1919, when the control was removed and the price fell to £33.10.0 Thereafter, the price again rapidly rose, the peak being reached in February, 1920, with an average of £69.10.0 per ton. Thereafter, the price sagged, until at the present time the lowest level recorded has been reached at £9.10.0 per ton. Prices for coconut oil have followed a somewhat similar course.

Characteristics of Copra and Coconut Oil.

The quality of copra varies considerably according to the degree of care exercised in its preparation. Well-prepared copra is white, of low moisture content and hard; it should be free from dirt, moulds and smoke and should contain from 4 to 6 per cent. of moisture and not less than 65 per cent. of oil. Well-prepared copra is less liable to mould attack and insect attack than low grade copra; the presence of excessive moisture conduces to the growth of mould which, in turn, favours the attack of insects, both leading to material loss in weight in transit, not attributable to moisture loss alone.

Generally, copra is classified according to its country of origin and is graded into two qualities. The higher quality is known as f.m.s. (fair merchantable sundried) although the term "sundried" does not necessarily describe the method of preparation—and is used as a trade description—and f.m. (fair merchantable).

The recognised order of merit of copra produced by various countries is shown in a table. The first ten places are for the f.m.s. grade from Malabar (f.m.g.w.s.)*, Ceylon, Seychelles, Mauritius, West Indies, West Africa, Java, Straits, Dutch Indies, Samoa (Plantation). Ceylon f.m.s. commands a premium of 5 per cent. over Straits; Straits f.m.s. 15 per cent. over Southseas f.m.s., and 17 per cent. over Philippine f.m.s.; Straits Sundried commands 21 per cent. premium over Straits Mixed.

Copra is employed exclusively for the manufacture of coconut oil, the quality of which depends on the quality of the copra crushed. Good copra produces an oil with a minimum amount of free fatty acid, suitable, when refined, for edible purposes, whereas oil expressed from lower grade copra is mostly used for soap making.

The highest grade of copra was formerly that coming from the Malabar coast of India, but this is now consumed in the country of origin. The second place is held by Ceylon copra, but this is also coming on the markets in decreasing quantities, largely owing to the fact that India appears to be taking more and more of the Ceylon supplies.

Straits f.m.s. copra formerly ranked above copra from Netherlands India, but during the past two years the position has become reversed and f.m.s. Java copra is now graded higher than Straits copra. Southsea Islands copra, which is one of the largest sources of supply, is definitely of low grade.

The general indications are that, in the existing depressed condition of the market, the demand for high grade copra is increasing.

* "Fair merchantable good white sundried". The term "sundried" and "kiln-dried" are terms of quality and do not necessarily indicate the method of manufacture.

Owing to the price grouping of copra according to the country of origin, it is difficult for any improvements in market quality effected by producers to meet with an immediate response of an enhanced price; this is said to be due to the fact that little interest is taken by buyers in individual consignments, although cases exist where estates, which have established a reputation for turning out high quality copra, can command a steady premium for their produce. On the other hand, a general upgrading of the quality of copra shipped from any country seems likely, in the long run, to meet with a better market demand.

Concerning the future outlook of the market, it seems problematic whether, at prevailing low prices, shippers can possibly maintain the present high rate of exports. Many estates unfavourably situated as regards cost of transport can only work at a loss and it is therefore doubtful whether they will continue to collect the nuts under present circumstances.

For the time being, it may be expected that the Philippine producers will continue to compete for the European business, but the possibility is not excluded that the present record crop may be followed by a smaller production next season.

As will be observed, there is unfortunately no improvement in sight in the price of copra. As for other oilseeds, visible supplies are plentiful, and with the existing low price of butter, the value of edible fats can hardly improve to any considerable extent. Therefore, it will only be a general improvement in world trade conditions, or an automatic drop in copra shipments, which can lead to higher prices for this article.

The Malayan Position.

In Malaya, coconuts are cultivated mainly in the neighbourhood of the sea coast and in particular on the west coast; moderately extensive native-owned plantations, however, occur along the banks of some of the larger rivers.

On the west coast and in the inland areas, the crop is usually cultivated on heavy clay soils, offering a marked difference in this respect from the majority of countries in which coconuts are grown. On the east coast, however, cultivation is on sandy soils. Various attempts have been made to grow coconuts on the peaty soils which occur at certain points, but, on the whole, the results have been unfavourable.

The area planted with coconuts in Malaya is estimated at approximately 637,000 acres, of which 315,000 acres are in the Unfederated Malay States, 240,000 acres in the Federated Malay States and 82,000 acres in the Straits Settlements.

Small holdings occupy a total area of approximately 500,000 acres; it is estimated that there are about 300,000 such holdings, the average size being 1.7 acres. Of the total area 1/7th represents immature areas.

Estate cultivation is mainly confined to the Federated Malay States and the Straits Settlements, the total area being about 125,000 acres. There are 165

coconut estates in Malaya of an average size of 670 acres, of which 37 are over 1,000 acres in extent.

The products of the industry comprise fresh nuts, copra and coconut oil together with a certain amount of toddy. There is at present little production of coconut coir or charcoal. The total production is, to a certain extent, a matter of conjecture, as a considerable proportion of the produce is consumed locally and of this quantity no records exist. It has, however, been estimated that the total average production for Malaya, in terms of copra, is 5.5 piculs (1 picul = 133½ lbs.) per acre, estates producing 10 piculs per acre and small holdings 4.6 piculs per acre. The Ceylon average has been estimated to be 8 piculs per acre.

In Malaya, it is not the practice to apply fertilisers to coconuts. Extensive and thorough drainage and careful sea-bunding are necessary if coconuts are to do well and this may be regarded as offsetting the saving at present effected in manuring.

The net exports of coconut products from Malaya in 1933 were approximately 9,000 tons fresh coconuts, 110,500 tons of copra, and 17,500 tons coconut oil—to the total value of over 11½ million dollars. The peak year was 1926, when the value of net exports of coconut amounted to over 25 million dollars.

The production of coconut oil has steadily increased of recent years, it is manufactured in 11 factories besides production as a cottage industry.

There is also a considerable entrepôt trade at Singapore and Penang in copra imported from Netherlands India and re-exported.

Of a total gross export of 210,585 tons of copra in 1933, 49,633 tons went to the United Kingdom, 17,618 tons to the United States of America, and 139,545 tons to European countries.

Estimated Capital Value of the Industry.

The capital value of the industry at the present time is estimated to be:—estates \$50,000,000; small holdings \$120,000,000. It appears that the sale value of small holdings has been halved since 1929. At present values of produce, the turnover of the industry is estimated to be:—estates \$3,250,000; small holdings \$4,500,000. In the year 1929, the annual turnover was estimated to be \$27,000,000.

The f.o.b. cost of production in 1933 was \$2.90 per picul as compared with \$5.80 in 1929 (41 per cent. of this is represented by labourers' wages). Under emergency conditions in 1934, production with maximum efficiency gave an average anticipated f.o.b. cost of \$3.30 per picul, reduced efficiency \$2.75 and utmost economy \$2.30 per picul.

Conditions on Small Holdings.

It is impossible to arrive at a similar estimate of costs of production on small holdings. In certain districts, where the holdings consist almost entirely of coconuts, severe poverty prevails. Wherever small-holders possess additional

resources, such as rice or rubber land, conditions are considerably better. The position constitutes a demonstration of the truth of the assertion that, in the case of a small-holder, dependence on pure stands of any one crop is a very insecure basis of livelihood.

Practically everywhere, small-holders are heavily in debt. It is usually most pronounced in the areas which have been longest settled. For the most part, these debts were contracted in time of higher prices. Under the present condition of affairs, there seems little hope of the majority of the small-holders ever being able to settle these debts in full.

Many of the lands have already been leased and in a few cases, especially where young coconut areas are concerned, the owners have abandoned their land. It is difficult to see anything, save a very sharp rise in the price of produce, of which there appears to be little prospect, which could markedly alleviate their difficulties.

The question is bound up with the general problem of rural indebtedness which is outside the terms of reference of the Committee.

In any event, it is important that these people should not be dispossessed of their lands and their crops; it is also important that desirable immigrant Malay population should be retained and re-emigration prevented so far as possible. In these circumstances, lenient treatment is indicated and dispossession of small-holders for non-payment of rent should only occur in the last resort.

The present position of all coconut producers is extremely difficult and precarious; it is comparable with that of rubber growers during the rubber slump and deserves very sympathetic treatment.

While no general control of output is applicable to the coconut industry in Malaya, yet low prices for oils and fats must in due course bring about natural restriction of output.

It is suggested that the present difficulties are largely the result of the uncontrolled introduction of capital into the oils and fats industries.

Prohibition of Further Planting of Coconuts.

It is recommended that no further alienations of large blocks of land for coconut planting should be made. Owing to the important part which coconuts play in the economy of the small-holder, such prohibition should not apply to small holdings, but in future alienation of land to small-holders, it should be stipulated that not more than 1/5th of the total area shall be planted in coconuts.

Empire Preference and Protection.

The principal markets have hitherto been on the Continent of Europe and in the United States of America. Restrictions on imports in the former area and the heavy processing tax recently introduced in America, hamper and restrict trade in copra. The American legislation may divert a large part of the enormous Philippine supplies to European and other markets.

Of the total world exports, about 40 per cent. is derived from the British Empire. In view of this fact, it is suggested that representations be made asking for preference and protection of Empire copra and coconut oil against the three serious competitors of coconut oil, which are wholly or in considerable part produced from foreign sources of supply, namely: soya beans, whale oil and cotton seed, which are at present admitted to the United Kingdom duty free.

It is suggested that the Imperial Government might consider the possibility of requiring that a fixed minimum percentage of coconut oil must be included in margarine produced and/or sold in the United Kingdom. Further, it is suggested that the Imperial Government should be invited to negotiate for the inclusion of British Empire coconut oil in the quotas for importation of vegetable oils and fats which have been established in various countries.

Expanding Malayan Foreign Trade.

India.—India is now a large importer of coconut oil and fresh coconuts. Exports from the Malabar Coast, which were at one time considerable, ceased in 1927. Ceylon exports to India have increased from 6,000 tons copra equivalent in 1929 to 54,000 tons in 1933. Malayan coconut oil exports to India have increased from 1,500 tons in 1932 to 7,200 tons in 1933. It is suggested that Malaya should endeavour to obtain an increased share of this market and should emulate the Ceylon plan of judicious advertising and investigation with this end in view. The fresh nut trade has been affected by an Indian tariff which places Malayan nuts in the same category for duty as nuts from Netherlands India, while Ceylon nuts are admitted on more favourable terms. It is hoped that present negotiations with the Indian Government with a view to obtaining favourable treatment for Malayan nuts may be successful.

The possibilities of further extending the present Malayan trade in Burma, Siam, and the China Coast is discussed, while attention is drawn to the probable increased demand in the future from Russia.

Present Unorganised Malayan Coconut Industry.

The present position calls for better organisation of the local coconut industry. There is in the country no organised body which can claim to speak for the industry as a whole. It should be of advantage if an organisation, representative of the coconut interests of the Peninsula, could be formed. Such an organisation might be a branch of the Copra Producers' Association, which it is understood, is in process of formation in the United Kingdom.

Expanding Local Consumption of Coconut Products.

The amount of coconut oil consumed locally compares unfavourably with the quantities used in countries such as Ceylon. This is in part due to the presence here of nationalities accustomed to use other kinds of oil. It is

thought that an extended consumption of coconut oil might result from propaganda and advertisement. The problem of extending the local consumption of coconut products consists, in part, of inducing a population which is accustomed to one form of oil to substitute another for it. Modern methods of refining render it possible, without difficulty, to remove the odour and taste of coconut oil, while it may also be possible, by judicious blending or other treatment, to impart to coconut oil the flavour of other oils such as groundnut oil.

Import Duties on Oils and Fats in Malaya.

The position regarding import duties is difficult by reason of the Customs systems in Malaya. At present, with certain exceptions, all classes of goods are freely admitted into the Straits Settlements, while duties at various rates are charged on certain commodities entering the Federated Malay States and the various Unfederated Malay States. These duties take little account of affording specific assistance to local industries, and are in need of revision. In the existing scale of duties there is considerable divergence between States and there are a number of anomalies.

A large entrepôt trade in copra is centred chiefly in Singapore. The imports consist mainly of low-grade copra from Netherlands India. The bulk of this is re-exported, but a certain proportion is crushed in Singapore and enters into competition with oil produced from Malayan copra on the Malayan markets.

Imports of Philippine copra are likely to occur in the near future, and unless steps are taken to prevent it, it is probable that the local market will be flooded with oil produced from Philippine copra which cannot find an outlet elsewhere. Under present conditions, no action seems possible in so far as concerns the Straits Settlements, but the Committee sees no reason why the Government should not consider the revision of tariffs so as to afford some protection to locally-produced oils and fats.

It is therefore suggested that the Governments of the Malay States should impose duties on any oils and oil-bearing materials which could enter into competition with coconut oil and are not at present taxed, while they should also consider the possibility of raising their duties with a view to increasing the use of coconut oil prepared from Malayan copra.

It is recommended that an import duty on foreign coconut oil be made equivalent to that borne by other vegetable oils, but that all oil produced from copra made in the British Empire should be allowed free entry into the Malay States. This may lead to the establishment of new oil mills in the Malay States and favour the expansion of trade of existing mills.

Soap Making.—There is an increasing industry in the manufacture of soap in Malaya.

There is no import duty on soap in the Malay States. The imposition of such a duty is recommended with preference to British soap.

It is further recommended that a Standing Committee of officials be appointed for the purpose of watching the situation regarding imports, the effect of import duties and similar matters.

Coconut Sweet.—Coconut sweet, so common in other tropical countries, is hardly seen in Malaya, and coconut biscuits and cakes are not made to any great extent. It is suggested that a cookery book or pamphlet containing instruction for utilising coconuts in domestic cookery might be prepared for use in schools and for general circulation.

Desiccated Coconut.—The Committee considers that the feasibility of extending the production of desiccated coconut for domestic consumption should be investigated and remarks that on this point some experiment and investigation is required.

Fresh Nut Sale.—The possibility of increasing the local sale of fresh nuts is considerable. There is a big disparity in prices of nuts in coconut-producing districts and of those in market towns situated at no great distances from these sources of supply. Co-operative effort is suggested to organise the supply of fresh nuts throughout the country. The regular supply of nuts to estates outside coconut areas suggests itself.

Grading standards for fresh nuts are a present need. The Committee thinks that a system of grading based on size of nut is needed.

In passing, a Coconut Exhibition is suggested as a means of extending the consumption of coconut products.

Direct Assistance to the Industry.

The direct assistance by Government can take three forms.

1. *Reduction or remission of export duties on coconut products.*—Export duty on copra in the Federated Malay States is $1\frac{1}{2}$ per cent. *ad valorem*, with an addition of 1 cent per picul for research: coconut oil is free. In Johore, until recently, copra paid either $2\frac{1}{2}$ or 5 per cent. export duty according to conditions of tenure of land. In Kedah, the duty amounts to $2\frac{1}{2}$ per cent. *ad valorem*; in Kelantan and Trengganu, the export duties are 3 per cent. and 5 per cent. respectively, *ad valorem*. There is no export duty in the Straits Settlements, but estates pay assessment which on the average works out at approximately \$2 per acre per annum.

It is recommended that export duties on coconut products should be waived until such time as the price rises to a more profitable level. (This waiver should not apply to the cess for research). Export duty has already been waived in Johore from 1st June 1934, with an estimated loss of revenue of \$50,000 per annum. Similar action in the Federated Malay States would involve a loss of revenue of about \$40,000 per annum. The loss of revenue in Kelantan and Trengganu would be negligible.

2. *Rents.*—Rents on coconut land vary somewhat in different States: the average however, appears to be from \$1.50 to \$2 per acre. The Committee recommends a temporary remission of part of the rent on coconut land. As

an alternative, the proposal is made to reduce rent to a maximum of \$1 per acre per annum, or the reduction of all rents by 50 per cent. Unplanted reserves should be regarded as planted areas and should be required to pay the same rent.

3. *Drainage Rates.*—These rates vary according to the original cost of the work and the cost of maintenance. At present prices of copra, and in two typical cases, these drainage rates amount to about 10 per cent. of cost of production of copra on estates and to 15 per cent. of the cost of production of copra on small holdings.

The Committee recommends that drainage rates should be reduced to an amount which represents the expenditure on upkeep of the works and should not include, for the present, any capital charges.

These recommendations for relief are intended to be only in the nature of a temporary waiver until such time as recovery in the price of coconut products warrants a return to the rates previously in force. It is pointed out that, if the recommendations already made for increased duty on certain imported oils and fats are approved, the increased revenue may, to some extent, offset the losses.

The suggestion of an export subsidy on copra of first quality was considered by the Committee. The conclusion was reached that on principle it was unsound, and in practice, it would involve so many administrative difficulties that the Committee was unable to recommend it.

Relief in the Straits Settlements.

The Committee considered that the Government of the Straits Settlements should favourably consider a reduction in the assessment so as to afford an increase of relief equivalent to that which would be accorded to growers in the Malay States, if the foregoing recommendations are approved. It appears that the question of assessment of coconut small holdings in the Straits Settlements may stand in need of revision.

Malayan Copra.

Annual exports of copra from Malaya are about 200,000 tons of which nearly half consists of imports from Netherlands India, so that the nett annual export production from Malaya is about 110,000 tons of copra. A considerable additional amount is crushed in local oil mills for consumption locally or for export. In 1933, nett exports of copra were 110,588 tons and of coconut oil 17,568 tons, which in terms of copra is equivalent to about 30,000 tons. It is estimated that a similar amount of coconut oil is manufactured and consumed locally, so that in 1933 the total output of copra in Malaya may be estimated to have been about 170,000 tons.

Malayan copra is marketed in two grades "f.m.s." (fair merchantable sundried) and "f.m." (fair merchantable). These are export grades artificially created at the point of shipment, copra from all sources, both local and

imported, being picked over, re-sorted and re-graded for export. It follows that Malayan exports are not necessarily 100 per cent. Malayan production; they may be graded and blended with copra from foreign sources.

Copra as received from estates and local dealers is usually classed as either estate quality or mixed quality, the expression "sundried" being often loosely applied to indicate copra of superior quality.

While the prices realised for individual lots of copra sold to dealers in the coconut areas on the same day show wide variations, the daily market quotations for Singapore and Penang show a definite difference in prices for copra of f.m.s. and f.m. qualities. With the gradual fall in price which has taken place, the difference between the market value of f.m.s. and f.m. copra has tended to become greater.

In 1926, this difference amounted to 3.1 per cent. of the ruling price but for the first six months of 1934 the difference amounted to 18.9 per cent.

This may be taken to indicate that under existing conditions, when there is an increased surplus of vegetable oils, the tendency is to discriminate more in favour of good quality copra.

Attention has repeatedly been drawn to the steadily deteriorating quality of Malayan copra. In 1929, a scheme of research work towards the improvement of Malayan copra was undertaken by the Department of Agriculture. The scheme has been in operation for the past five years and much has been done to indicate the manner in which Malayan copra can be improved and to disseminate the information to estates and small holdings. It has been shewn that the improvement of the appearance of Malayan copra to a quality equal to that of the highest grades produced elsewhere is relatively easy. Practically all estates have taken steps to improve their methods of manufacture accordingly, and in many parts of the country marked improvement has also taken place in the quality of the small-holders' produce.

In spite of these local improvements, the reputation of Malayan copra on the world's markets shews no improvement.

The mixing of imported copra with the Malayan produce may have a depressing effect on the reputation of Malayan copra. In view of this fact and of the possibility of increased imports of low-grade copra from the Philippines, it is suggested that an investigation of the influence on the reputation of local copra of large importations of inferior copra might be undertaken.

Estates that are preparing a high class copra which they ship direct are of opinion that the premiums they obtain are not commensurate with the extra labour involved in making it. It has been suggested that this may be due to lack of competition in the market, or to the fact that the consignments are too small to attract the large buyers. Enquiry into this question is recommended, leading to such alteration to the existing system of grading as may appear advisable.

The existing standard for the f.m.s. grade of Straits copra may be too wide and it is suggested that, in their own interests, producers should consider

the possibility of establishing a super-grade comprising the better part of the present f.m.s. grade and copra of specially good quality.

The Committee agrees with the feeling of estate producers that it is a sound policy to continue efforts to improve the standard of Malayan copra and it is believed that once a superior grade has become established and recognised locally, its acceptance by the European market will probably only be a question of time. In this connexion, group selling, as obtains in certain other industries, might be considered.

Coconut small holdings are mainly owned by Malays and until 1930, the nuts therefrom were almost entirely sold to Chinese dealers who prepared from these a very low grade copra on primitive kilns.

With the fall in prices in 1930 Malays were induced to undertake the preparation of copra. In consequence, a large number of primitive kilns were started throughout the country. More recently, thanks to the efforts of the Department of Agriculture, the Malay owners have erected at various points some 50 kilns which incorporate the latest ideas in relation to kiln construction. The change that has taken place in this respect is of considerable magnitude and importance. An extension of this scheme is therefore advocated.

There is evidence to show that small-holders are not in all cases obtaining full value for their produce. Fortunately, the existence of more or less open markets in Penang, Singapore and Klang have tended to counteract the formation of rings and combines among buyers with the object of depressing prices. Attempts to organise Malay copra-producers into groups for marketing their produce have so far had but little success, but the intervention of independent buyers has usually served to maintain a reasonable parity of prices. It becomes clear that so long as the small-holder who produces copra is more or less tied to selling it locally to small dealers, there will be little inducement for him to prepare good dry copra. If, however, he can be organised to sell a better product in a market which will pay for a better product, it will normally be worth his while to produce the better quality. The Committee therefore commends any efforts designed to persuade the small-holders to combine both for production and sale.

The Committee recommends that dealers in copra and coconut products should be licensed annually, with the object of preventing unfair practices and of checking thefts of coconuts and copra from estates and small holdings. It also recommends that current market prices for copra should be regularly posted at public points in towns and villages where coconuts and copra are bought and sold.

Malayan Coconut Oil.

Coconut oil is produced in 11 factories; there are also two oil mills on estates which at present operate on groundnuts, but which could undertake the production of coconut oil; there is also a not inconsiderable and growing industry in the preparation of coconut oil by small-holders.

The largest mill is situated in Singapore and the second largest in Penang. Both produce oil for local consumption and for export, and one of them is contemplating the introduction of a refining plant.

The production of coconut oil in Malaya for export is increasing. It might be an advantage if large mills could be established in the important coconut producing areas where none exist *e.g.*, at Bagan Datoh in Lower Perak, in the neighbourhood of Batu Pahat in Johore and possibly in Kelantan, with the object of stimulating local competition and raising prices for small-holders' produce.

Bulk shipment of coconut oil is not at present practical, probably because no facilities exist in Asiatic ports to which much of the oil is shipped. Bulk shipment appears to offer possibilities of further economies in production and, as this is a question which affects the industry as a whole, it is one which should receive attention. The production of coconut oil on estates may present possibilities and should also be carefully examined.

It seems probable that processes might be capable of being devised for improving the quality and keeping power of oil produced by small-holders. Investigations into this subject should be undertaken by the Department of Agriculture and if a satisfactory method can be evolved, steps should be taken to bring it to the notice of this class of producer.

By-products of the Industry.

Coconut Coir.—It seems doubtful whether any great prospect of success can attend the introduction into Malaya of a factory system of manufacture of coir. It appears, however, that the possibilities of developing a native coir industry in Malaya should be worth exploring. If the village inhabitants could be instructed in methods of preparing, spinning and weaving coir, a useful addition to existing industries could probably be made and a material utilised which at present goes to waste. It is suggested that this matter be considered by the Department of Agriculture, and if, on investigation, circumstances warrant such a step, a suitable officer should be sent to the Malabar Coast of India for the purpose of investigating the coir industry and acquiring practical details which would assist in developing and popularising the coir industry among small-holders in Malaya.

Coconut Shell Charcoal.—The making of charcoal from coconut shells seems worthy of attention. Such charcoal is reputed to be the highest class of charcoal fuel which can be produced. A considerable industry in the manufacture of shell charcoal exists in Ceylon, the produce being either sold in the village, converted to produce gas, or sold to smelting works in Colombo. Efforts should be made to popularise this industry among small-holders inasmuch as, like coir, it might represent a useful additional source of income.

Coconut as a Source of Alcohol and Sugar.—Coconuts are employed to some extent in Malaya as a source of alcohol and sugar, the palms being tapped

for this purpose. There is a considerable production of toddy for sale to estate labourers, also coconut sugar is produced to some extent in the villages. The production of arrack only occurs to a limited extent. It is doubtful whether in Malaya any great possibilities exist for extension in these directions.

Coconut Oil as an Illuminant and a Source of Power.—It is doubtful whether efforts should be made to re-popularise coconut oil as an illuminant in small holdings as it involves substituting an inferior article for one (refined mineral oil) which is definitely superior. Mixed with a mineral oil, however, coconut oil might be free from the objections to its use alone. Further investigations should be instituted on this subject and if found advisable, the information on the subject disseminated.

The possibility of using coconut oil as fuel in internal combustion engines has also been suggested, but the Committee doubts whether, even at present prices, it is likely to prove an economic proposition.

Freights on Copra.

The present position is that freights to Europe and America from Malayan ports are controlled by the Straits Homeward Conference, which also controls similar freights from neighbouring countries; the declared policy of the Conference is to maintain freights at a parity between the various points of shipment in the Far East. In the case of copra, however, this has been replaced by a system of six-monthly contracts since August, 1933.

The freights on oil seeds from Malayan ports have varied considerably during the past 20 years. At present the rate on copra from Singapore and Penang is 27s. 9d. per 12 cwt. nett weight. If, however, copra is shipped from Port Swettenham, it is subject to an additional arbitrary charge of 9s. per ton. This formerly applied to all classes of goods, but has been removed in the case of rubber.

Coconut producers and exporters urge that the freight rates are too high; that the elimination of competition for freight through the operation of the Conference operates adversely to the industry; that the arbitrary charge on Port Swettenham shipments is unjust; that the alleged parity between shipment from different points in the region controlled by the Straits Homeward Conference has not been properly maintained; and that soya beans—which are an important competitor with copra on European markets—are carried from Manchurian ports at an open competitive rate and that the freight is lower than that on copra.

As against this, it has been urged that any decrease in freight rates would not bring any advantage to the copra industry because it would immediately be offset by a corresponding lowering in the c.i.f. price.

The Committee felt that sufficient weight may not have been attached to the fact that copra is selling in competition with a number of other oils and oil seeds which, owing to a variety of causes, have to bear much lower trans-

port charges. Consequently, any fall in the c.i.f. price would tend to improve the position of copra in comparison with its competitors and might lead to enhanced sales.

The Committee agreed that producers and shippers have a legitimate complaint as regards the more favourable position of foreign-produced soya beans and also that producers have a definite grievance in relation to failure to maintain the parity with Ceylon which has been established for some years. The Committee found it difficult to see what justification exists for the maintenance of the Port Swettenham arbitrary surcharge.

The elimination of competition for freights may not be entirely desirable, but the advantages which the Conference affords in the provision of regular and reliable facilities for shipment must not be overlooked. It would be unfortunate if efforts to expand the trade in the Far and Near East should be handicapped by the existence of freight rates which might act as a bar to expanding trade.

The securing of better terms for freight is bound to be a matter for negotiation; the establishment, therefore, of an organisation which can speak for the industry as a whole would serve a useful purpose.

It has been represented that the charges for wharfrage levied on coconut produce by the Federated Malay States Railways at Port Swettenham are operating adversely to the coconut industry. The rates were examined and the conclusion was reached that compared with Singapore and Penang, the Port Swettenham charges are heavier, amounting to about 3 per cent. of the value of the goods at present prices. It is suggested that consideration should be given to the possibility of effecting some reduction.

Research in relation to the Coconut Industry.

Compared with other crops, the amount of research accomplished with reference to coconuts is relatively small, and much of it of recent date. At the present time the work has been extended in Malaya, which was the pioneer of systematic work on selection and manuring. Coconut research schemes are also in operation in Ceylon, and in the Celebes in Netherlands India.

In Malaya, research on coconuts is conducted by the scientific staff of the Department of Agriculture, and a specialist officer is attached to the Department for research work on copra. The cost of this work is met by a cess on copra exports from the Federated Malay States.

The Department conducts manurial, cultural and drainage trials and work on the preparation of copra on its coconut experiment station of 80 acres at Klang. The enlargement of this Station to about 200 acres is recommended.

The Department carries on co-operative manurial trials on ten estates. Work is also performed on insect and fungoid affections of the palm. An excellent bulletin containing an account of the various insect pests has been published, and the results of work on certain fungoid diseases have appeared from time to time in departmental publications.

Copra research work has continued uninterruptedly since 1929. It has comprised the investigation of methods of improving Malayan copra and has been shown to have had a marked effect on improving the quality of copra, both on estates and on small holdings. The Officer-in-charge visited Ceylon in 1930 and subsequently prepared a special bulletin (issued in 1931) which gave a full account of the Ceylon industry and suggested means for improving Malayan copra. A large number of other papers on various subjects connected with copra production have also appeared in the *Malayan Agricultural Journal* from time to time.

The value of the work performed is admitted and it is recommended that it should be further improved and, if need be, extended to include work on coconut oil and its utilisation in manufacturing and other processes.

Apart from this, more fundamental research is required, dealing, for instance, with the oil percentage of Malayan copra, and variations in quality and quantity of copra as between districts.

The services of the Officer-in-charge of Copra Investigations should be placed on a more permanent footing. His value to the industry is considerable and his specialised knowledge of the consuming and manufacturing side of the industry is particularly useful in view of the need for fostering and extending the use of coconut products. Arrangements should also be made for the continuation of his work when he is on leave.

The service is at present financed by a cess of 1 cent per picul on copra exported from the Federated Malay States, and a contribution thereto is made from Straits Settlements funds on a basis of 25 per cent. of the Federated Malay States contribution; formerly, it was partly supported by a contribution from Empire Marketing Board funds, but this ceased in 1932. No contributions are at present made to the work from the funds of the Unfederated States, notwithstanding the importance of the coconut industry in some of them, particularly in Johore, and of the fact that free use is now being made of the results of the work by Johore.

The cess should continue to be levied in the Federated Malay States and the Unfederated Malay States should also be invited to contribute.

The sum at present provided in the estimate for the work, *viz.*, \$12,000 represents the approximate yield of the Federated Malay States cess; when the Straits Settlements contribution is added to it, the funds annually collected for the purpose amount to about \$15,000, the difference at present going to the Federated Malay States general revenue. This is not considered right; the industry has agreed to tax itself to maintain the work in a time of considerable difficulty and either the whole amount yielded should be applied for the benefit of the industry, or the cess in the Federated Malay States should be reduced to yield with the Straits Settlements contribution the amount required and no more.

The need has been shewn for increased provision of staff to enable the work to be extended; if the contributions collected in the Federated Malay States and from the Straits Settlements are made fully available and are supplemented by proportionate contributions from the Unfederated Malay States and particularly Johore, an adequate sum should be available for the purpose. Accordingly, it is recommended that the Director of Agriculture should be instructed to put forward appropriate proposals.

The need for increased provision for instructional services for small-holders has been indicated. There is at present one Malay officer whose work is concerned solely with instruction in relation to copra-making amongst small-holders. Regular courses of instruction in this subject to Malay officers of the Department and certain local headmen have been held at the Department of Agriculture with satisfactory results. In view of the need for further improving the production of copra, for extending the utilisation of coconut products in other directions, developing new uses and organising growers for manufacture and marketing, this provision requires extension.

A proposal for a staff of Asiatic Instructors for work in various States in connexion with the coconut industry was recommended by the Committee with one dissentient.

It was also recommended that the existing courses of training for local headmen and Agricultural Assistants should be extended to include other aspects of the coconut industry, and as the results of research in various directions became available, information concerning these should be included therein.

The Oil Palm Industry.

Oil palm products comprise palm oil and palm kernels; the former is derived from the fleshy pericarp of the fruit, the latter being contained in the seed; both are used as sources of oil, with the difference that palm oil is extracted in the countries of production, but the kernels are almost entirely shipped to European countries and America, where the oil is expressed.

Palm oil is utilised mainly for soap making, but a further field of utilisation is the tin plating industry in which it is used as a flux, and this is largely extending as a result of the growth of the food canning industries. The utilisation of palm oil in the manufacture of margarine and edible fats is small, and in certain other directions consumption has declined, notably in the candle industries and as a lubricant.

Palm kernel oil is used, on the other hand, in much the same way as coconut oil, which it resembles and for which it can be readily substituted in margarine and soap manufacture, and to a limited extent also for pharmaceutical and toilet preparations.

Palm oil and palm kernels are derived from the extensive belts which occur naturally in certain parts of West Africa, and more recently from the plantations established on an estate scale, particularly in Sumatra and Malaya. In French

Equatorial Africa and particularly in the Belgian Congo, important developments have occurred both in improving natural palm areas and also in establishing areas planted with oil palms on an estate scale.

The area of oil palm areas in Africa is unknown. In the East the planted areas in 1932 were:—Sumatra 169,000 acres, of which 89,500 acres were in bearing; Malaya 61,025 acres, of which 17,974 acres were in bearing.

The industry in both Sumatra and Malaya may be said to have developed almost entirely since the War. Between 1927 and 1932, the total increase in planted area in the two countries was 115,000 acres.

From a commercial point of view, varieties of oil palm fall into two main types, *viz.*, those of which the fruit has a thin pulp (pericarp) and thick shell, yielding a relatively small amount of palm oil and a large amount of kernels, and those of which the fruit has a thick fleshy pericarp yielding a relatively large amount of oil and a small amount of kernels.

The oil palms in West Africa largely consist of varieties which fall into the first class and it is from there that the bulk of the palm kernels and palm kernel oil supplies of the world are derived; the oil palms in the more recently developed areas consist, for the most part, of the second class and yield a higher proportion of palm oil.

In British West Africa, palm oil is extensively used by the indigenous population for cooking and as an illuminant and only a small fraction of the total production is exported. The production is almost entirely in the hands of the natives, whose methods are wasteful and inefficient. Despite recent efforts to encourage the producers to improve the condition of existing palms and to adopt better methods of extracting palm oil, progress has been small. The palm oil from this source, therefore, is generally of inferior quality, both from the point of view of cleanliness and acidity.

In the East and to some extent in the Belgian Congo and in French Equatorial Africa, the production of palm oil has proceeded on different lines, the product being planted on an estate scale and modern factory methods of extracting the oil being practised. As a result, the product is of much higher quality, being free from dirt and of low acidity. On this account, palm oil from these sources has acquired a position of recognised supremacy in the world markets and normally commands a premium over West African oil.

The total exports of palm oil from producing countries in 1932 were 272,144 tons, of which 126,862 tons were from the British Empire. In the same year exports of palm kernels were 620,986 tons, of which 395,038 tons were from the British Empire.

The export of palm kernels remains predominantly West African, but the East is yearly gaining an increasingly important share of the palm oil exports.

The rise in importance of Dutch and Belgian colonies and of British Malaya as palm oil producers is one of the outstanding features of the vegetable oils situation; its significance lies in the fact that their production is well planned

and scientific and the product is turned out with the minimum of waste and the maximum of quality.

In 1932, the total exports of palm oil from Sumatra and Malaya amounted to 83,000 tons, *i.e.* approximately 30 per cent. of the total world exports. It is probable that in five to six years from the present time the total output of palm oil from these two sources will be 180,000 tons and thus come within measurable distance of supplying the world's demand for palm oil if this does not increase beyond the present figure. If to this total be added the steadily increasing production from estate plantations in the Belgian Congo, the demand may exceed the supply.

The major supply of palm kernels comes from West Africa. Palm kernels produced in the plantation industry are generally of lower quality than the native produce of West Africa, owing to the methods employed in extracting palm oil from the fruit.

The indication, therefore, is for high grade plantation palm oil gradually to replace lower grade palm oil, obtained from natural sources, on the world markets, while palm kernels from natural sources will continue to hold the field for many years to come.

Distribution of World Supplies.

The consumption of palm oil rose steadily from 1924 to 1930; thereafter, it has tended to diminish. The principal country of importation is the United States, with England second and Germany third; in the United States and Germany, consumption increased very greatly between 1924 and 1932; in England it has remained steady. It has been stated that in the United States the only source of utilisation for which palm oil is considered indispensable is in the tin plating industry; the consumption of oil for this purpose in the United States of America is stated now to be 15,000 tons per annum. In the United Kingdom, the South Wales tin plate industry absorbs about 3,500 tons.

In 1933, the United States of America imported 125,585 tons of palm oil, the United Kingdom 61,720 tons, Germany 42,992 tons, Italy 48,975 tons and France 15,721 tons. In the same year, the most important importing countries of palm kernels were Germany 244,298 tons, United Kingdom 128,049 tons, Holland 29,060 tons and Denmark 20,890 tons.

The situation created by the imposition of the new processing tax on imported vegetable oils in the United States is bound, however, to have an equally serious effect on the market for palm oil as on that for coconut oil, and the outlook for the industry is on this and other accounts very difficult.

Market Prices of Palm Oil and Palm Kernels.

Palm Oil.—In the years immediately prior to the War, prices for palm oil (Bonny Old Calabar) were relatively stable at about £30 per ton. During the War, the upward trend was very similar to that of copra, though it did not reach such high levels, the price being fixed in 1917 at £48 per ton. On the removal

of control, prices rose to about double the controlled price in 1920, but falling by the end of that year to below it. From 1921 to the end of 1929 prices generally ranged from £31 to £38 per ton with a sharp rise in December, 1924 to £44 per ton which was, however, not maintained. Since 1927, prices have steadily sagged until at the end of May, 1934, they reached the unparalleled low level of £11.15.0 in barrels and £8.10.0 in bulk per ton.

Quality of Palm Oil.—Palm oil is sold on a basis of the content of free fatty acids. Bulk palm oil is exported on a 5 per cent. free fatty acid basis.

West African palm oil in barrels is sold at Liverpool on a basis of 18 per cent. free fatty acid, a bonus of 1s. 9d. per ton is allowed for each unit below 18 per cent., and a similar amount is deducted per ton for each unit in excess of 18 per cent.

There is also a market in Liverpool for plantation palm oil in barrels on a 5 per cent. free fatty acid basis. Malayan palm oil is included in this category.

Palm Kernels.—The market for palm kernels in the years immediately before the War showed relatively greater fluctuation than did palm oil, ranging between £16.12.6 and £24 per ton and averaging £20 per ton. In the early years of the War, the price sagged, but recovered in 1915; in 1917, the prices of palm kernels and palm kernel oil were fixed at £26 and £52 per ton respectively. On the removal of price control in 1919, prices jumped, £45 per ton for palm kernels and £110 per ton for palm kernel oil being reached early in 1920. Thereafter, prices sagged sharply to £18.10.0 for kernels and £40 per ton for kernel oil in 1921. Prices remained relatively steady until 1929 at between £18 and £22 per ton for kernels, and £35 to £44 per ton for kernel oil. By the end of 1929, prices again declined and by the end of 1933 kernels had fallen to £7.18.9 per ton. The decline continued and at the end of June, 1934, Malayan palm kernels were quoted at £5.15.0—the lowest ever recorded.

The Malayan Position.

Oil palms in Malaya are cultivated exclusively as an estate crop and alienation of less than 200 acres for planting with this crop is not permitted.

Cultivation is mainly confined to the States of Perak, Selangor and Johore, with smaller areas in Negri Sembilan, Pahang and Kelantan. The total planted area at the end of 1933 was 63,646 acres and unplanted reserves 47,021 acres.

Conditions in Malaya are particularly well suited to the cultivation of oil palms. The crop is planted on 33 estates, the average size of an estate being nearly 2,000 acres. The largest estate is situated in Johore and is 10,173 acres in extent. Of the total area, nearly 35,000 acres, or rather more than half, is controlled by two planting groups which also control considerable areas under the same crop in Sumatra. It is considered that the most economic unit for an estate is about 10,000 acres.

Of the total planted area, only about 12,000 acres can be regarded as being in full bearing; a further 19,000 acres are in partial bearing, while 32,000 acres

have not yet reached the production stage. It is, therefore, obvious that production is bound to increase considerably during the next five or six years.

Yield of Palm Oil and Kernels.

Yields are dependent on the character of the material planted. The earlier plantations in Malaya and Sumatra were established with unselected seed. A maximum yield of 1,600 to 1,700 lbs. of palm oil per acre per annum may be expected in such cases.

More recently, the planting of high-yielding selected seed has become extensively practised; when seed of this type is employed, yields in the neighbourhood of 1 ton or more of oil per acre per annum can be anticipated. In Malaya, about 30,000 acres or 50 per cent. of the total area have been planted in selected seed; that is, however, practically confined entirely to the more recently established estates which have not come into full bearing.

If yields are to be maintained, manuring is essential. A considerable amount of work on this subject has been performed in Malaya and Sumatra, and the manurial requirements of the crop are known with fair exactitude. The dominant fertilising constituent is phosphoric acid, and phosphoric dressings—usually in the form of ground rock phosphate—are now regarded as an essential part of planting practice.

In addition to palm oil, the palm kernels at an average rate of 3 cwt. per acre are produced.

Organisation of Production.

Oil palm estates are, in general, well planned and planted, and the majority of the factories modern and up-to-date. The larger estates are provided with excellent transport facilities.

The extraction of oil demands the use of moderately elaborate installations. Two alternative factory systems for oil extraction exist, *viz.* the centrifugal system, by which the oil is extracted from the fruit by a centrifugal plant, and the press system, by which the oil is pressed out in hydraulic presses. The efficiency of the alternative systems is about equal, although the press system is more expensive to install. In Malaya, seventeen centrifugal systems have been installed and three press systems.

Marketing of Produce.

Almost the entire crop is exported, though a limited quantity of palm oil is used locally in soap works.

Shipment of oil was formerly effected entirely in barrels, but in 1933 a company was floated for the shipment of palm oil in bulk by tank steamers, which has established a very efficient bulk shipment plant at the Tanjong Pagar Docks in Singapore, capable of handling the whole of the present production of the industry and of being increased to meet requirements as the industry

expands. One large company has established its own bulk shipment plant at Port Swettenham. Subsidiary bulking plants have been erected on certain estates, and arrangements have been made with the Federated Malay States Railways for the transport of oil to points of shipment in bulk in tank waggons. A certain amount of the crop is, however, still shipped in barrels, usually for destinations where facilities for the bulk handling of the product do not exist.

The marketing of palm oil in Malaya is controlled by a pool which includes all the more important producers. There are also two similar selling pools in Netherlands India which work in association with the Malayan pool.

An association of palm oil producers has been formed under the name of "The Palm Oil Producers' Association of Malaya" with the object of protecting the palm oil industry and affording members facilities for co-operation in matters affecting their interests.

Research on Oil Palms.

Throughout its development, the industry has made free use of scientific investigations and research and its present highly efficient condition is undoubtedly to a considerable extent due to this. Research work on many questions connected with the crop has been performed by the Department of Agriculture in Malaya and by the A.V.R.O.S. Experimental Station in Sumatra. Investigations have dealt with all branches of the industry, and the results published in the bulletins of these two organisations.

There are about 200 acres of oil palms under experimental cultivation at the Central Experiment Station at Serdang with an experimental factory.

A work on "Oil Palms in Malaya" was issued by the Department of Agriculture in 1927; this is now out of date and out of print; a new edition is in the press and will shortly be published which will provide an up-to-date and complete handbook for the industry.

The research work is closely followed by planters and the results of it are immediately applied; also the services of Government scientific officers are in constant requisition for advice and guidance. The industry is highly appreciative of the facilities afforded by Government in this connexion. In addition, certain of the largest planting groups themselves employ scientific officers for work on the crop. Between these gentlemen and the staff of the Department of Agriculture close collaboration exists.

When the highly organised condition of the palm oil industry is contrasted with that of the coconut industry, the difference is striking. It is obvious that the industry is in a much better position to meet emergencies than is the coconut industry.

Terms of Alienation of Land for Oil Palm Planting.

In the Federated Malay States, prior to 1925, a premium of \$3 per acre and rent of 50 cents per acre per annum for the first 6 years and thereafter at \$2 per acre were charged. Since 1929, the premium has been raised to \$10

per acre with a rent of \$1 per acre per annum for the first 6 years and \$4 per acre thereafter with a rebate on such areas as are actually cultivated with oil palm. Provision has been made for the levying of an export duty of $2\frac{1}{2}$ per cent. *ad valorem*, but this has not yet been imposed.

In Johore, the terms of alienation are a premium of \$3 per acre with a rent of 50 cents per acre per annum for 6 years and \$1 per acre thereafter.

Estimated Capital Value of the Industry.

It is computed that the total capital which has been invested in the industry amounts in round figures to \$20,000,000.

Condition of the Industry.

The average cost of production of palm oil in Malaya is about 3 cents per lb. f.o.b. made up as follows:—field costs .60 cent; harvesting .45 cent, manufacture .40 cent, local transport .53 cent, other local charges 1.00 cent. Of these charges, 30 per cent. represents labourers' wages.

Three cents per pound is equivalent to £10 per ton c.i.f. European ports. About 3 cwt. of kernel are obtained for every ton of oil, but at the present price of £5.15.0 per ton the extra cost of production is stated to leave no margin of profit.

In these conditions, it is clear that oil palm estates in Malaya are, almost without exception, operating at a loss at the present time.

Unlike Sumatra, the arrival of the majority of plantations in Malaya at the bearing stage has coincided with the decline in prices. Nevertheless, until the end of March 1932, the level of prices was such that the average estate in bearing was in a position to cover its costs and if this price level had been maintained, could with progressive increase in yield look forward to moderate profits.

The situation has, however, completely changed owing very largely to the imposition of the American processing tax; it is impossible to foresee what the ultimate outcome will be, but obviously the situation requires the most careful watching and sympathetic treatment. The industry represents an asset of great value to the country on account of the capital embarked therein, the employment which it affords to a large number of people, and because it constitutes an outstanding example of development according to an ordered plan, while its present difficulties are due to economic and political events which could not have been foreseen.

Suggestions for Relief of the Oil Palm Industry.

The basic economic factors which apply to the oil palm industry are similar to those which relate to the coconut industry, so that, generally, measures applicable in the case of the one can be applied to the other.

There are, however, certain difference in size of the unit area operated; degree of organisation at present; difference in yield of oil per acre, variation

in range of employment of the products—coconut oil having the wider range of uses—difference in area under the two crops.

No measures of artificial restriction of production are recommended to meet the present situation and owing to its excellent organisation, it is thought that the oil palm industry is in a better position to weather this difficult situation than is the coconut industry.

Prohibition of Further Planting.

It is recommended that no new large-scale alienation of land should be made for planting oil palms. On the other hand, the planting of oil palms should not be prohibited on reserve lands already alienated for the crop; the economic size of plantation units is of importance in operation and, in spite of low prices, it may be to the advantage of certain properties to complete their planting programmes. In any event, the addition to planted areas that are likely to occur as the result of this, can have very little effect on the situation.

Relief by Regulation of Markets.

Relief by the intervention of the Imperial Government is recommended, with a view to regulating the admission to the markets of Great Britain and the Dominions of foreign whale oil, soya beans and cotton seed, which compete with palm oil as well as coconut oil from the British Empire.

It is understood that by certain methods of treatment, palm oil can be successfully used in margarine manufacture and it is suggested that the industry should explore the possibilities in this direction with a view to obtaining an increased share of the trade.

Expanding Malayan Foreign Trade in Palm Oil.

It is thought that opportunities exist for expanding exports to the markets of the Near and Far East and to Russia, and these should be investigated. The fact that the industry is already well organised for representation of its interests and for collective sales places it in a favourable position to undertake such investigation and negotiations.

Increasing Local Consumption.

The opportunities for expansion of local consumption are less favourable than in the case of coconut oil, colour, taste and smell being against it. Unrefined palm oil is particularly rich in Vitamin A and on this account is a very desirable article of diet.

It has been employed successfully in Malaya to replace butter fat in skimmed milk for feeding calves; with success in rearing puppies and also when fed to in-whelp bitches during the period of gestation and lactation.

An attempt to encourage its use in the above directions should be made by judicious advertisement,

Direct Assistance to the Industry.

As a temporary measure of relief in the Federated Malay States, it is suggested that quit rent on land alienated for oil palm cultivation might be reduced to the Johore level, *viz.* 50 cents per acre per annum for the first 6 years, and thereafter \$1 an acre per annum—the relief to be regarded as being in the nature of a temporary waiver and to be subject to revision annually.

Reserves.—It is considered that, during the present depressed condition of the industry, insistence on the fulfilment of cultivation clauses should be postponed. In the case of all lands alienated for palm oil cultivation, application for relief from any penalties which may be liable to be imposed for failure to comply with the terms of alienation should be sympathetically considered.

Freight on Palm Oil.

There is a general feeling amongst producers that freights are too high. The rates for bulk shipment of palm oil quoted by the Conference are 51s. 6d. per ton as against 48s. per ton for coconut oil, and in both cases an extra charge of 2s. per ton for cleaning the tank is made. The reason for this differentiation is not obvious and it appears to discriminate heavily against palm oil.

Research in Relation to the Industry.

The industry should continue to receive assistance from Government in the matter of scientific advice and research; owing to the relatively small size of its export at present and the difficult position in which it is placed, it is obviously out of the question that the industry should at present be called on to contribute thereto. It is considered, however, that when the prospects of the industry improve and it is reaching the stage of full production, the question of its making some contribution to the cost of research should be considered.

Other Vegetable Oil Industries in Malaya.

The only edible oils and oil-bearing materials of vegetable origin, which are of major importance locally, other than coconut and oil palm products, are Groundnut (Kachang) oil, Gingelly (Sesame) oil and Soya beans.

Groundnut Oil.

The oil is derived from the fruit of the leguminous plant *Arachis hypogaea*, which receives its name from the peculiar habit of ripening its fruit in the ground. It is an annual crop and takes about five months to mature from time of planting.

The fruits, which have a slightly sweet, nutty flavour, contain about 30 to 50 per cent. of oil according to variety.

The cultivation of the crop is world-wide, being grown largely in North and South America, in parts of Africa, and also extensively for export and local consumption in India, China and Netherlands India.

The oil comes on the market in two forms—cold-pressed and hot-pressed; the cold-pressed oil is nearly colourless and has an agreeable taste and smell and is largely used for edible purposes; the hot-pressed oil is of a yellow colour and is used in soap manufacture. The press cake is very rich in nitrogen and on this account is highly prized both as a stock food and as a manure.

The world's export production of groundnuts is in the region of 1,200,000 tons. The largest exporters are India, China, Nigeria, Senegal and Gambia.

Malayan Position.

Groundnut oil is the principal oil consumed by the Chinese population and large quantities of oil and groundnuts are imported annually, the oil from imported nuts being extracted in local oil mills. The nett imports into Malaya in 1933 were 11,730 tons of groundnut kernels and 6,856 tons of groundnut oil, to a total value of \$2,434,638. In 1932, 98 per cent. of the imports of groundnuts came from Netherlands India; 63 per cent. of the oil from China and 37 per cent. from Netherlands India.

In 1933, duties for revenue purposes, were imposed on groundnuts and groundnut oil imported into the Malay States and in the same year under the Ottawa Agreement, differential duties were added, whereby a preference was accorded to groundnuts produced in the British Empire. In the Straits Settlements, however, groundnuts from all countries are admitted free of duty.

The imposition of the differential scale of duties has led to an appreciable increase in the importations of groundnuts from India. Imported groundnuts are crushed and converted into oil both in Singapore and at certain points in the Federated Malay States. Under the Ottawa Agreement, groundnut oil expressed in the Straits Settlements is regarded as a manufactured article and, as such, is admitted to the Malay States at the British preferential rate of duty, provided it can be shown that 25 per cent. of the labour and/or materials employed in its manufacture are British. In consequence, oil millers in the Federated Malay States complain that they are placed at a disadvantage inasmuch as, while they are restricted to the use of Empire groundnuts, their competitors in Singapore labour under no such restriction and can obtain their groundnuts from a cheaper and nearer foreign source of supply.

There appears to be foundation for this complaint, but in existing circumstances, it is not easy to see what remedy can be applied.

It appears, however, that the definition of a manufactured product may not be devoid of difficulties and it is arguable whether groundnut oil can be classified in this category.

Groundnuts are grown to a small but increasing extent locally; the cultivation is practised by Chinese small-holders and the crop is grown in rotation with vegetable and other crops.

The total area cultivated under the crop in Malaya in 1933 was estimated to be 1650 acres. It is cultivated in the Federated Malay States, mainly in Perak and Selangor, and in the Unfederated Malay States, mainly in Johore and Kedah.

Under favourable conditions, it is possible to obtain two crops per year off one piece of land, so that 400 lbs. to 800 lbs. of oil per acre per annum can be obtained, the rate being halved if only one crop is taken.

Prices for groundnuts have ranged from an average of £19 per ton in 1929 to £11 per ton in 1933 c.i.f. European port.

Gingelly Oil.

This oil is extracted from the seed of *Sesamum indicum*, an annual erect-growing bush, of which the small flat seeds contain about 50 per cent. of oil.

India is the largest grower of gingelly. The world's production is estimated to amount to about 750,000 tons and exports to 150,000 tons. The largest exporter is China.

The seeds contain 40 to 50 per cent. of oil. Gingelly is a bland oil, nearly colourless and without smell. If carefully prepared, it keeps sweet; it is used for cooking and edible purposes. In India, it is also used for anointing the body, for illumination and for the manufacture of soap.

Malayan Position.

Considerable quantities of gingelly seed and oil are imported into Malaya annually. In 1933, 2811 tons of gingelly seed and 24 tons of oil were imported to a total value of \$264,680.

In Malaya, the oil is largely used by Indians, and the recent diminution of imports is attributed to the considerable repatriation of Indian labour that has occurred. The oil is for the most part expressed by Indians in the vicinity of large towns, small wooden mills of the mortar type operated by bullocks being employed.

Under average conditions, the crop grows well in Malaya, and it is somewhat surprising that it is so rarely cultivated. The crop takes three months to mature from the time of sowing the seed; yields vary from 500 to 1,000 lbs. of seed per acre per crop.

Gingelly oil is subject to duty on importation into the Malay States, differential duties having been imposed in favour of Empire products as part of the Ottawa Agreement. Gingelly seed pays no duty.

Soya Beans.

The soya bean is the seed of a leguminous plant indigenous to China, Japan and Indo-China. The largest producers are China and Manchuria. The annual crop is estimated at 13,000,000 tons, of which 5,000,000 tons come from Manchuria. It is also grown extensively in the East in Korea, where annual

production is about 560,000 tons, Japan about 375,000 tons and Java about 100,000 tons. Exports from China and Manchuria average about 2,000,000 tons a year with the addition of a further 100,000 tons of oil—equivalent to 700,000 tons of beans.

The crop is now also cultivated on a large scale in the United States, where in 1931 the total area approximated to $3\frac{1}{2}$ million acres, the crop amounting to 121,000 tons, and in Russia, where in 1931 the total area was stated to be 1,100,000 acres. With the restriction of imports of coconut oil and palm oil into the United States consequent on the processing tax, the further expansion of soya bean cultivation in that country seems probable.

Attempts have been made to grow the crop in India, Burma, South Africa and Australia, but, so far, without success. In Malaya, experimental work by the Department of Agriculture has shewn that the crop will grow fairly well and it is cultivated to a small extent by Chinese market gardeners, but all attempts to popularise it have, so far, failed.

The crop yields about 600 lbs. of beans per acre; the seed contains 16 to 20 per cent. of oil and has thus a much lower oil content than the other oil-bearing materials which have been considered. It is extensively used as an edible oil and for margarine manufacture; before the art of refining was as well understood as at present, some difficulty was experienced in deodorising the oil satisfactorily, but now the taste and smell can be completely removed. The nett imports of soya beans into Malaya during 1933 were 13,207 tons, shewing a sharp increase over the previous year.

There is, however, no industry in Malaya in extracting the oil from the beans; consequently, soya beans can hardly be considered as competing with locally produced oil-bearing materials, although the possibility of their doing so must not be overlooked.

Recommendations regarding Groundnuts, Gingelly and Soya Beans.

In view of the need for extending the consumption of locally produced coconut and palm oils, marked encouragement of the cultivation of other vegetable oils that may compete therewith should be avoided.

The replacement of groundnut oil by coconut oil and palm oil in domestic consumption in Malaya is desirable. The process of replacement is, however, likely to be gradual; it may lead to the placing of blends of coconut oil with groundnut oil on the market and the erection of refining plant for coconut oil and will probably have to be accompanied by propaganda designed to popularise the change.

Imports of groundnuts and groundnut oil are bound to continue for some time, and the moderate extension of groundnut cultivation for the production of oil for direct consumption or for blending should not be discouraged.

The replacement of gingelly oil by coconut oil should prove easier of accomplishment.

While soya beans are not at present a direct source of oil for domestic use, the possibility must not be overlooked. The imposition of a duty thereon in the Malay States should be considered.

The appointment of a Standing Committee to advise the Governments concerning duties on oils and fats has already been recommended and it is considered that this question should be referred to it.

Oils and Oil-bearing materials of minor importance in Malaya.

There are a number of other vegetable oil-bearing materials capable of being produced in Malaya, which might compete with coconut and palm oils, but which are not at present of sufficient importance to need more than passing reference. The most important are: cotton seed, kapok seed, maize, tea seed, illipe seed, mahua and sunflower seed, and a number of others.

Mention should also be made of Piquia oil obtained from the fruit of a South American tree, yielding an oil not dissimilar to palm oil and of which a plantation was established some years ago in South Kedah. The prospects for the extension of its cultivation do not appear to be particularly favourable and the oil has not, so far as is known, appeared on the market.

There are also a number of non-edible oil-yielding crops which could be grown, notably castor oil, which is extensively cultivated in India and elsewhere; the prospects for its successful cultivation in Malaya do not, however, appear to be great. Castor oil is used as a lubricant, in soap making and as a medicine.

Tung oil, yielded by various species of Aleurites, has also repeatedly attracted attention as it is derived from plants which might be capable of being grown in Malaya. It is chiefly employed as a drying oil for use in paints; it is also used in China as a wood preservative and as an illuminant. It is chiefly produced in China and is in steady demand; the plant is now also being grown in several countries, notably the United States of America.

The results of experiments have shewn that its cultivation offers small prospects of success on the plains in Malaya.

Rubber Seed Oil.

Although rubber seed oil is hardly a commercial product at present, it demands more than passing reference owing to the fact that large quantities of rubber seed are produced annually on rubber estates in Malaya. In 1929, it was estimated that the total yield of rubber seed was about 225,000 tons per annum from a planted area of $2\frac{1}{4}$ million acres, and from the present planted area of about $3\frac{1}{4}$ million acres the estimated production is probably in the region of 300,000 tons. It is, of course, impracticable to collect the total amount produced, but it is probable that about 100,000 tons per annum could be gathered and marketed.

Rubber seed consists of approximately 40 per cent. shell and 60 per cent. kernel. The seed contains approximately 25 per cent. of oil, calculated on the whole seed, so that the annual potential output on the basis of 100,000 tons of exportable rubber seed would be approximately 25,000 tons. The oil itself is

a semi-drying oil, that is to say, it is capable of being used in the manufacture of paint, although its qualities in this respect are inferior to those of linseed oil; it can also be used for the manufacture of soap. It is uncertain to what, if any, extent it could be used as an edible oil. Under the Rubber Regulation Enactments, the export of rubber seed from countries adhering to the International Agreement is prohibited.

It appears that no duties are at present levied on rubber seed or rubber seed oil imported into the United States of America and as a result, renewed enquiries have lately been received from America as to the possibility of developing a trade in this product. It seems possible that means might be devised for sterilising rubber seed prior to export, so that the risk involved of sending out viable seed would be minimised, although it could not be entirely removed; or, alternatively, if the seed was decorticated locally before export and the export of undecorticated seed prohibited, the same end could be secured.

On the other hand, such a trade would involve adding one more source of supply of oil to the already over-stocked world market and, in view of the fact that the imposition of the United States processing tax is apparently designed to assist the American farmers, it seems not unlikely that, if a considerable import of rubber seed or rubber seed oil into the United States developed, it might only be a question of time before a similar duty was imposed on rubber seed. On the whole, it is undesirable to make any special arrangements to facilitate export of this product.

Volatile Oils.

The only other vegetable oils which have any importance locally are volatile or essential oils. There is a small trade in the cultivation and distillation of patchouli and citronella in Johore, Province Wellesley and Penang, while cloves are also grown in Penang and Province Wellesley to some extent. As, however, these constitute an entirely separate and distinct industry, they need only be mentioned.

Abstract.

EIGHTEENTH REPORT ON NATIVE RUBBER CULTIVATION IN NETHERLANDS INDIA.

First Quarter 1934.

*Prepared by the Bureau of Agricultural Economics of the Agriculture
Fishery Service of the Netherlands Indian Department of
Economic Affairs at Batavia, Java.*

Prices.

Price variations continued as a results of increased American consumption and the confidence felt in the satisfactory conclusion of the restriction negotiations.

Java standard sheet at Batavia rose from 13.8 guilder cents per $\frac{1}{2}$ kg. in December 1933, to 14.4 cents in January 1934 while average prices in subsequent months were 15.6 guilder cents in February and 16.3 guilder cents in March per $\frac{1}{2}$ kg.

The price for medium blanket advanced to a greater extent than did the price for the estate product, i.e. from 9.3 guilder cents per $\frac{1}{2}$ kg. in December 1933 to an average of 13.2 guilder cents per $\frac{1}{2}$ kg. in March 1934. In relation to the sheet prices, the blanket price in December was 67.4 per cent. thereof, in January 70.1 per cent., in February 77.5 per cent., and in March 81 per cent.

Exports.

Exports of native rubber reacted to these improved prices. Whereas the export of such rubber in the last quarter 1933 was 38,954 metric tons, that of the first quarter 1934 was 50,714 tons, the monthly figures being: January 1934, 15,293 tons, February 14,675 tons, March 20,746 tons. The lower exports in February are attributable to the short month and to the fact that in many rubber regions padi was being harvested.

The provinces exporting rubber may be divided into two groups. The first group comprises the provinces of Palembang, East Coast of Sumatra, Tapanoeli, Sumatra West Coast, Banka and Dependencies, and Achin and Dependencies—in all of which the exports have greatly advanced in the past six months. In the second group are Western Borneo, Djambi, Riouw and Dependencies and, to a lesser extent, also the South and East Sections of Borneo. In these Provinces the export increase has proceeded but very gradually.

The large increase of rubber exports from the provinces in the first group is due to the fact that the tappable rubber is still considerably in excess of the area actually tapped and also that, up to the end of the first quarter, there was

no great scarcity of labour. In this quarter no factors intrude to any important degree which would tend to limit production.

In the second group, labour shortage may be the reason for the slower increase of exports. Labour will flow from the thickly populated parts growing foodstuffs to the more thinly populated rubber districts, but rubber production in such regions will vary, as food production is of first consideration.

It is not possible, in view of the greatly extending rubber tapping, to give an estimate of the proportion of the tappable rubber now in production; the various reports, however, indicate that extensive areas, especially in Djambi, Palembang, South and East Borneo, and Western Borneo, were not being tapped towards the end of the quarter under review.

Local Reports.

Achin and Dependencies.—At the end of the quarter 60 per cent. of the tappable rubber was being tapped. To an increasing extent, tappers were being employed on wages. The price of wet slab at Langsa advanced from fully f 8 per 100 kg. in January to f 15 in March.

Tapanocli.—Exports by way of Sumatra West Coast and Pakan Baroe were maintained at fully 200 tons per quarter. The two rubber factories produced 322 tons of blanket sheet, as against 487 tons in the fourth quarter 1933. This regression reflects an important improvement in quality of the native product (sheety crepe), of which only a small amount was unfit for direct export and required re-milling.

Tapping coolies are generally paid in produce, yet wages have been reported in some cases. The improved conditions in the rubber regions have resulted in a general price increase for necessities, so that it was possible for rice export regions (such as Toba) to profit from the rubber revival.

Sumatra West Coast.—A considerable increase of tapped area is reported, but extensive areas of tappable rubber are still left untapped. Most of the labour is still family labour, while tappers receive as wages two-thirds of the product.

Palembang.—Exports increased from 5,666 tons in the last quarter of 1933 to 9,893 tons in the first quarter of 1934. Tapping areas were extended, both on new areas and on previously tapped areas.

Prices in the interior ceased to follow Singapore price increases.

Djambi.—Due to scarcity of labour there was no increased rubber production.

Riouw and Dependencies.—The production remained fairly constant, due to labour shortage.

Banka and Dependencies.—Exports increased from 265 tons in the last quarter of 1933 to 634 tons in the first quarter of 1934.

In the last report, mention was made of an increasing preparation of sheet rubber and of a considerable import of rubber mangles. This development

greatly increased in the first quarter of 1934. At the port of Pangkal Balam, 132 rubber mangles were imported in the period under review.

The quality of rubber has greatly improved; nearly all rubber is now worked up into sheets.

Western Borneo.—The exports in the fourth quarter 1933 were 7,620 tons, and increased to 9,887 tons in the first quarter 1934. Work is mostly effected by family labour in the smaller holdings, but in the larger holdings labourers from the district on wages are employed.

South and East Borneo.—The exports from this region from August 1933 up to the present time averaged from 2,400 to 2,500 tons a month. Only after the west monsoon wet padi had been harvested and the east monsoon wet padi fields had been planted did a distinct reaction to better prices become evident, when many labourers left the thickly populated Oeloe Soengei region for the thinly populated rubber districts in the hilly country, to exploit the rubber holdings on a share basis.

Tapping extended along the east coast of Borneo, so that in March some rubber was exported from Samarinda.

Rubber factories shewed increased activity and towards the end of the quarter under review, they were working at full capacity.

Departmental.

FROM THE DISTRICTS.

August, 1934.

*Compiled by the Chief Field Officer from Monthly Reports
submitted by Field Officers.*

The Weather.

In the northern half of the Peninsula the rainfall exceeded average. With a few exceptions, precipitation was below average in the southern areas. Conditions in Johore and Singapore were hot and dry practically throughout the month.

Remarks on Crops.

Rubber.—Prices remained firm throughout the month and showed an increase in all States over those of the preceding period.

In some centres instructional activities have resulted in the manufacture of improved sheet, with a consequent premium for quality.

With the exception of Malacca and Johore, where tapping is heavy, more particularly in the latter State where multiple cuts are reported to be tapped two or three times daily, excision is conservative due partly to regulation, but mainly to the exigencies of padi cultivation.

Further improvement in the maintenance and sanitation of holdings has been recorded, while disease control has received a satisfactory measure of attention. A steady demand for approved fungicides has been maintained.

Coconuts.—There has been a decline in the production of good quality copra from small holdings as a result of unsatisfactory prices. It is reported that increased interest has been taken in the manufacture of coconut oil.

Copra from improved types of small holdings kilns realised up to \$3.30 per picul, which represents at the present time a high standard of quality.

Padi.—In Kedah, Perak and the Province satisfactory weather conditions enabled good progress to be made with cultural and planting operations. The rice caseworm *Nymphula depunctalis* was responsible for much nursery damage in the southern mukims of Krian, and flood damage affected some 497 acres at Padang Lallang in the Kota Star district of Kedah.

Work in Pahang is well advanced, but portions of Negri Sembilan and Selangor are backward. Transplanting in the inland districts of Malacca is practically complete, but the preparation of land within the coastal belt has been delayed owing to lack of water.

Conditions at Segamat and Tangkah in Johore are satisfactory, but in other centres little work has been done, and much land left uncultivated.

Tobacco.—Prices have remained steady in Johore except in Segamat district where supplies have been plentiful. The area under this crop at Kluang has been extended. The export of dry leaf from Jerantut in Pahang to Kuala Lumpur has been maintained.

Fruit.—In Negri Sembilan, durian, langsung and rambutan are in season in the Kuala Pilah District, and durian and rambutan are being harvested in Jelebu. The crop is small but of good quality. A good crop of machang is reported from Pahang, but durians in that State have been disappointing. The mango season in Krian was extremely poor.

The main fruiting season for pineapples ended early in the month. Owing to shortage of supplies of fruit a number of the factories have temporarily ceased operations.

Agricultural Stations.

The total crop of green leaf harvested during the month at the Tanah Rata Experiment Station, Cameron Highlands, was 7,969 pounds from which 1,506 pounds of made tea were manufactured.

Satisfactory distributions of planting material have been maintained from all Stations.

An area of twelve acres of jungle land has been provisionally selected for large scale experimental work on pineapples in southern Johore.

Padi Stations and Test Plots.

At the Telok Chengai Station in Kedah, all planting was completed under excellent weather conditions. A new experiment to ascertain the effect of not cutting back nursery seedlings was laid down.

Planting commenced and good progress was made at the Titi Serong Rice Experiment Station, where nurseries benefitted considerably by favourable rains throughout the month.

With the exception of short term padi, planting was completed at the Pulau Gadong Station, Malacca.

Good progress has been made on all padi test plots including developmental work on new areas in Perak and Selangor.

Rural Lecture Caravan.

The Rural Lecture Caravan commenced an extended tour of Pahang, and at the end of the month had visited most of the important centres on the Pahang river between Temerloh and Pekan.

Carp Rearing.

A further 3,000 fry were received from Singapore and delivered to a breeder at Chat in Pahang. A former consignment is making good progress

in the ponds at Benta, and has now reached a size of approximately two kati (nearly 3 lbs.) each. They are being fed on guinea grass and tapioca leaves.

An experimental consignment of fry from Singapore to Kelantan, despatched in sealed containers with an excess of oxygen in the water, arrived in excellent condition. This method of transport reduced costs which were previously unduly high.

Pigs.

A serious outbreak of swine fever occurred in the Seletar district of Singapore towards the end of the month. The Agricultural and Veterinary Departments are co-operating in an endeavour to control the epidemic which has caused breeders considerable losses.

Home and School Gardens Competitions.

The half-yearly judging of school gardens was completed in Province Wellesley and Penang during the month. The general standard of work in many of the gardens was very satisfactory.

171 entries have been received for participation in the home garden competition organised in Pahang, where a similar competition for school children is being arranged.

Penghulus' Course of Instruction.

In connexion with the special course of instruction for Penghulus, organised by the Department of Agriculture, during August, 35 Penghulus from the Straits Settlements and Federated Malay States attended a course of rice instruction at the Pulau Gadong Rice Station, Malacca. A course of lectures, complemented with field demonstrations covering the more important principles of husbandry, was delivered during the period August 19th to 22nd.

The M.A.H.A. Magazine.

Vol. IV, No. 3, July 1934. Price 30 cents.

The current issue of *The M.A.H.A. Magazine*—the official organ of the Malayan Agri-Horticultural Association and of the Selangor Gardening Society, contains, amongst other interesting features, two original articles, the first dealing with the planning of a medium-sized garden by F. Flippance; the second, by E. J. McNaughton on the Food Requirements of Plants. These authoritative articles may be confidently recommended to gardening enthusiasts.

DEPARTMENTAL NOTES.

Obituary.

Mr. C. B. Holman-Hunt, B.A. (Cantab), F.E.S., F.Z.S.

We regret to announce the death, at the age of 68 years, of Mr. Cyril Benoni Holman-Hunt, which recently occurred in London following an operation.

Mr. Holman-Hunt was appointed Curator of the State Museum, Selangor in 1909 and was transferred to the Department of Agriculture, Straits Settlements and Federated Malay States, in the following year as Assistant Entomologist, an appointment he retained until 1917 when he was promoted Systematic Entomologist. He remained in this post until his retirement from Government service in January, 1922.

He had a wide knowledge of the East, having resided both in Ceylon and India before coming to Malaya; being engaged in practical agriculture during this period, his experience was of value to his work in this Department. The old files of the *Malayan Agricultural Journal* will be found to contain numerous articles by him on the subject of Entomology which was not only his specialised subject, but which had always been his principal hobby.

The rapidly-thinning ranks of his contemporaries in Malaya—both his colleagues in the Department and his other friends throughout the country—will regret the passing of a man with an attractive, loyal, and cheerful personality.

"Pengkulus" Course.

A course of instruction for "Pengkulus" (local Malay headman) was held in two parts between August 8th. and 22nd. 1934. The first part was held at the School of Agriculture, Malaya, at Serdang from August 8th. to 18th., 44 attending the course. The subjects included nature study, marketing of village produce, small holding credit, improvement of small holdings, poultry husbandry. Visits were made to the Central Experimental Station, Serdang, where practical subjects studied included fruit cultivation, tobacco, coffee and other annual crops suitable for small holdings. The course was conducted by officers of the Department of Agriculture and of the Co-operative Societies Department.

For the second part of the course, from 19th. to 22nd., the party was distributed so that each pengkulu could study subjects of particular importance to his own district. One party, consisting of 9 pengkulus, went to the Klang Coconut Experiment Station for a course of lectures and practical work on the manufacture of copra; another party of 7 were at the Department of Agriculture, Kuala Lumpur, where officers of the Rubber Research Institute of Malaya were in charge of the course. Lectures were delivered on the preparation of good quality rubber, husbandry of small holdings, pests and diseases. Practical demonstrations were given in coagulating and machining, tapping, soil conservation, and treatment of mouldy rot disease. A visit was also paid to the

Rubber Experiment Station at Sungei Buloh. The third party, of 35 penghulus, proceeded to Malacca where at the Pulau Gadong Rice Station lectures were delivered dealing with the subjects of the various cultural operations, field estimation and measurement, pests and diseases: pure strain padi, method of selection and advantages; the importance of maintaining pure strains: advantages of communal work. Practical work included field demonstrations.

DISTRICT AGRICULTURAL SHOWS.

Kuala Selangor District.

The third Kuala Selangor District Agriculture Show was held on August 4th, 1934 and was opened by His Highness the Sultan of Selangor.

Exhibits in most classes were numerous. Fruit exhibits were few in number, owing to a poor mid-year crop, but of good quality. The vegetable section was the most outstanding feature of the show. Although not numerous, exhibits of coconut products, rubber and poultry were of a very satisfactory standard.

Departmental exhibits were staged by the Health, Co-operative and Agricultural Departments. A number of lectures, illustrated by lantern slides, were delivered on improved methods of copra production and on poultry management by a member of the Department of Agriculture.

Ulu Langat District, Selangor.

The third District Agricultural Show was held at Kajang on August 26th, 1934. The Show was opened by the Hon'ble Mr. F. W. South, Acting Director of Agriculture, S.S. and F.M.S.

The Show was not as successful as on previous occasions, insufficient notice having been given for the preparation of exhibits. With the exception of the Schools and Poultry Sections, exhibits were few in number. The Arts and Needlework and the Poultry Sections were very satisfactory and the exhibits of better quality than on previous occasions.

The Department of Agriculture staged exhibits and an officer of that Department delivered lantern lectures on poultry. The Health Department displayed exhibits concerning sanitation in the *kampong*, scavenging and conservancy, anti-malarial work and prevention of infectious diseases.

Statistical.

MARKET PRICES

August, 1934.

Rubber.—The price of rubber still continued to rise during August, opening at 23½ cents per lb. and closing at 25½ cents per lb. for spot loose in Singapore. The average price for the month in Singapore of Smoked Sheet, equal to London Standard was 24.8 cents per lb. as compared with 23.53 cents per lb. in July. The average price in London during August was 7.4 pence per lb. and in New York 15.37 cents gold per lb. as compared with 7.03 pence and 14.51 cents gold respectively in July.

Weekly prices paid during August for small-holders' rubber at three centres are shewn in Table I.

Table I.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, August, 1934.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.					Kuala Kangsar, Perak.				Batu Pahat, Johore.				
	2	9	16	23	30	8	15	22	29	1	8	15	22	29
Smoked sheet		30.35	29.55	30.25	30.00	28.60	29.26	29.21	30.00	25.93			28.16	27.71
Unsmoked sheet	26.74	27.08	26.81	27.35	20.44	25.75	26.20	25.80	26.92	24.85	25.75	26.28	26.74	
Rubber*														
Scrap			15.00				16.52	16.00	14.00					

* Wet unsmoked sheet.

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

Palm Oil.—The market continued to improve steadily during the month and its course is shown in the following table of the Malayan commodity: basis 5 per cent. f.f.a.

Table II.

DATE 1934.	PALM OIL			KERNELS
	L'Pool/Holland/ Hamburg c. i. f. landed weights in bulk per ton £. s. d.	L'Pool/Continent c. i. f. per ton net in barrels £. s. d.	Halifax (Nova Scotia), c. i. f. landed weights per lb. Cents gold.	Fair Average Malayan Quality c. i. f. Landed Weight per ton on Continent. £. s. d.
August 2	9 12 6	11 12 6	2.20	6 5 0
" 8	9 17 6	11 17 6	2.25	6 10 0
" 15	10 10 0	12 15 0	2.35	6 15 0
" 22	10 15 0	13 0 0	2.60	7 0 0
" 29	11 0 0	13 10 0	2.75	7 2 6

Copra.—Singapore prices of copra remained relatively stable during August. The sun-dried grade opened at \$2.90 per picul and after rising to \$3.10 in the early part of the month, eased again to close at \$2.95. The average price for the month was \$3 per picul as compared with \$2.95 in July. The average price for the mixed quality was \$2.40 as against \$2.49 in July.

Copra cake continued its upward trend during August closing at \$1.70 per picul. The average price for the month was \$1.43 per picul.

Rice.—The average wholesale prices of rice per picul during July were as follows:—Siam No. 2 (ordinary) \$2.78, Rangoon No. 1 \$2.77, Saigon No. 1 (long grain) \$2.82 as compared with \$2.66, \$2.50 and \$2.60 respectively in June. Corresponding prices in July 1933 were \$3.89, \$3.06 and \$3.52 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in June were:—Singapore 22, Penang 24, Malacca 23 as compared with 21, 25 and 23 respectively in June.

The average declared trade value of imports of rice in July was \$2.85 per picul as compared with \$2.93 in June and \$3.10 in May of this year.

Padi.—The price paid for padi at the Government Rice Mill, Bagan Serai, was advanced 25 cents to \$1.50 per picul during the month. Padi prices in Kedah increased from \$1.25—\$1.40 to \$1.70—\$1.75 per picul during the period under review. A corresponding rise in the price of rice is reported from the latter State.

Tea.—Tanah Rata (Cameron Highlands) tea was quoted in London during July at 1s. 1d. per lb. and Bigia tea was quoted at 1s. 0½d. and 11½d. per lb.

Average London prices per lb. for tea consignments from other countries were as follows:—Ceylon 1s. 0.95d., Java 10.83d., Indian Northern 1s. 0.88d., Indian Southern 1s. 0.53d., Sumatra 10.59d. Prices of all grades continued to decline during the month.

Tuba Root (Derris).—There was no change during August in the Singapore market of this commodity, prices continuing at the July average of \$34.50 per picul for roots sold on the basis of ether extract and \$40 per picul for roots sold on rotenone content.

Additional quotations are:—*D. Elliptica* from Johore and the Federated Malay States, \$40 to \$45 per picul, and the same species from Changi, Singapore, \$60 to \$70 per picul.

Coffee.—There was little change in the Singapore prices of coffee in August. Sourabaya opened and closed at \$20 to \$21 per picul according to grade, but weakened during the month to \$19 to \$20. Palembang coffee improved from \$12 per picul to close at \$13.60, averaging \$13.32 as compared with \$13.12 in July.

Local prices for coffee beans ranged, during the month, from \$15 to \$24 per picul in various parts of the country.

Arecanuts.—Singapore average prices per picul during August were as follows:—Splits \$3.85 to \$5.09, Sliced \$13 to \$16.60, Red Whole \$5.20 to \$6.10, Sourabaya Whole \$6 to \$7.10, Kelantan Whole \$4.20 to \$4.59, the price in each range depending upon quality. No prices were quoted for Bila Whole.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best \$3.98, Medium \$3.48, Mixed \$3.15.

Gambier.—Singapore prices continued almost unchanged in August, Block remaining steady at \$4 per picul and No. 1 Cube easing slightly to \$7.25, with an average of \$7.31 as compared with \$7.38 in July.

Pineapples.—Prices eased slightly during the month, although at the lower prices no business was passing and sellers were anxious to secure orders. August average prices per case were:—Cubes \$3.16, Sliced Flat \$3.11, Sliced Tall \$3.28 as against \$3.19, \$3.15 and \$3.35 respectively in July.

Prices for fresh fruits in Johore were:—First quality \$2—\$2.40, second quality \$1.50—\$2, third quality 80 cents to \$1 per hundred.

Prices in Singapore were \$2.50 and \$1.50 per hundred for first and second quality fruit. In Selangor prices ranged from 70 cents to \$3 per hundred according to quality.

Tapioca.—Prices in Singapore during August continued at the July level with the exception of Flake Fair which declined still further to average \$3.73 per picul as compared with \$3.94 in July. The price of Pearl Seed was \$5.75 per picul and of Pearl Medium \$6 per picul.

Sago.—Singapore prices rose slightly in August, averaging \$3.95 per picul for Pearl, Small Fair, and \$1.89 for Flour, Sarawak Fair as compared with \$3.84 and \$1.85 respectively in July.

Maize.—The Singapore market improved considerably during August, the price for Siouw rising to \$80 per picul throughout the month, and for Amboina to \$54 per picul at the beginning of August. The latter price fell away again, however, to its old level of \$50 per picul, giving an average of \$51 for the month.

Nutmegs.—Singapore prices remained steady throughout the month at the July closing level of \$24 per picul for 110's and \$25 per picul for 80's. Average prices for July were \$23.25 and \$24.25 respectively.

Pepper.—Prices advanced during the month, chiefly owing, it is thought, to buying of a speculative nature. Average prices per picul in Singapore were:—Singapore Black \$13.69, Singapore White \$36.63, Muntok White \$37.69 as compared with July averages of \$13.31, \$31.63 and \$33.12 respectively.

Cloves.—Prices in Singapore continued nominal at Zanzibar \$35 and Amboina \$45 per picul.

Tobacco: Prices of sun dried leaves ranged, in most parts of the country, from \$6 to \$60 per picul, according to quality. The price range in Kelantan was from \$40 to \$45, and in Johore from \$40 to \$80 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY

July 1934.

Malaya.—Imports of foreign rice into Malaya during July were 55,463 tons, and exports 13,838 tons, net imports accordingly being 41,625 tons. Net imports for the period January to July 1934 were 262,917 tons, an increase of 10.4 per cent. over the corresponding period in 1933.

Of the imports during July, 53 per cent. were consigned to Singapore, 17 per cent. to Penang, 6 per cent. to Malacca, 17 per cent. to the Federated Malay States and 7 per cent. to the Unfederated Malay States. Of the total, 71 per cent. came from Siam, 25 per cent. from Burma, 3 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during the month under review, 65 per cent. were shipped to Netherlands India, and 35 per cent. to other countries. The various kinds of rice exported were:—Siam 8,465 tons (61.2 per cent.), Burma 4,298 tons (31 per cent.), French Indo-China 346 tons (2.5 per cent.), India 636 tons (4.6 per cent.) local production 93 tons (0.7 per cent.).

India and Burma.—Foreign exports for the period January to May, 1934 totalled 814,000 tons, a decrease of 14.7 per cent. as compared with exports of 954,000 tons for the corresponding period of 1933.

The total exports of rice and bran from Burma for the six months 1st January to 30th June 1934 were 2,349,799 metric tons as compared with 2,062,703 metric tons for the same period in 1933, an increase of 13.9 per cent.

Siam.—Exports of rice from Bangkok in June were 109,308 tons, giving a total of 849,487 tons for the half year as compared with 828,020 tons for the first six months of 1933.

Japan.—According to the Ministry for Agriculture and Forestry, stocks of rice in Japan Proper on 1st July 1934, totalled 4,975,520 tons, an increase of 1,121,710 tons or 29 per cent. as compared with the corresponding period in 1933.

The supply and demand for the period 1st July to 31st October 1934, is estimated as follows:—

<i>Supply:</i> Stocks on 1st July	...	4,975,520 tons.
Imports of Korean rice	...	238,430 "
Imports of Formosan rice	...	280,500 "

<i>Demand:</i> Consumption (July/October)	...	3,178,960 "
Exports	...	21,040 "

showing a surplus of 2,294,450 tons.

It is stated (*Trans Pacific Journal* 26th July, 1934) that most of the 2,103,790 tons of rice held by the Government would deteriorate if the inclement weather continued and that if the weather did not improve in August, the outlook would be serious for this year's crop. In 1911 when similar weather prevailed, there was famine in Akita and Yamagata Prefectures and

as this year the bad weather has covered the greater part of Japan, the situation is considered far more serious than in 1911.

French Indo-China.—Entries of padi into Cholon, January to July 1934 totalled 942,854 metric tons as compared with 771,585 metric tons during the corresponding period of 1933 an increase of 22.2 per cent. Exports of rice for the same period this year were 905,004 metric tons, an increase of 4.6 per cent. as compared with exports of 865,047 metric tons during the corresponding period of 1933.

Netherlands India.—Imports of rice for the period January to May 1934, (*Economic Bulletin* dated 1st August, 1934) amounted to 72,836 metric tons, a decrease of 66 per cent. as compared with the imports during the same period of 1933, totalling 214,420 metric tons.

Ceylon.—The imports for the first seven months of 1934, were 277,911 tons an increase of 9.7 per cent. as compared with 253,370 tons for the corresponding period of 1933. Of the 1934 imports, 14 per cent. were from British India, 64 per cent. from Burma and 22 per cent. from other countries.

Europe and America.—Shipments to Europe from the East were 814,459 tons for the period 1st January to 19th July, 1934, as compared with 834,109 tons for the corresponding period of 1933, a decrease of 2.4 per cent.

Of the 1934 shipments, 41 per cent. were from Burma, 5 per cent. from Japan, 43 per cent. from Saigon, 9 per cent. from Siam, and 2 per cent. from Bengal. The corresponding percentages for 1933, were 52, 3, 38, 6 and 1 per cent. respectively.

Shipments to the Levant from the East during the period 1st January to 25th June, 1934, were 20,335 tons as compared with 17,121 tons for the same period in 1933, an increase of 18.8 per cent.

Shipments to the West Indies and America for the period 1st January to 24th June, 1934, were 109,550 tons as compared with 83,968 tons during the corresponding period in 1933, an increase of 30.5 per cent.

MALAYAN AGRICULTURAL EXPORTS, JULY, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-July 1933.	Jan.-July 1934.	July 1933.	July 1934.
Arecanuts ...	20,756	11,921	19,594	1,308	2,344
Coconuts, fresh† ...	100,609†	59,536†	58,227†	10,742†	12,532†
Coconut oil ...	17,568	10,507	14,509	1,064	1,926
Copra ...	110,543	46,626	54,302	7,531	9,475
Gambier, all kinds ...	2,560	1,361	1,239	144	197
Oil cakes ...	9,992	6,531	7,108	518	917
Palm kernels ...	1,983	962	1,664	170	319
Palm oil ...	12,101	4,923	7,388	830	1,159
Pineapples canned ...	59,582	40,358	48,382	7,684	8,825
Rubber§ ...	459,836§	251,402	238,619§	42,655§	31,079§
Sago,—flour ...	7,648	3,317	3,988	1,383	258*
,—pearl ...	2,646	1,220	2,588	171	465
,—raw ...	4,420*	2,430*	3,544*	393*	645*
Tapioca,—flake ...	9,881	6,669	4,434	661	320
,—flour ...	702*	128*	1,255*	13	17*
,—pearl ...	17,297	9,511	9,382	1,536	1,441
Tuba root ...	569½	270½	348½	39½	51½

† hundreds in number.

* net imports.

§ production.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPALE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING JULY, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)		
STRAITS SETTLEMENTS :—									
Province Wellesley	44,285	1,127	2.5	8,288	18.7	622	1.4	9,415	21.2
Dindings	7,368	112	1.5	918	12.5	158	2.1	1,030	14.0
Malacca	121,132	1,415	1.2	16,765	13.8	3,271	2.7	18,180	15.0
Penang Island	1,366	318	23.3	311	22.7	145	10.6	629	46.0
Singapore Island	28,842	4,831	16.7	3,927	13.6	716	2.5	8,758	30.3
Total S.S. ...	203,013	7,803	3.8	30,209	14.9	4,912	2.4	38,012	18.7
FEDERATED MALAY STATES :—									
Perak	253,227	4,647	1.8	36,217	14.3	12,132	4.8	40,864	16.1
Selangor	310,003	3,291	1.1	43,525	14.0	12,174	3.9	46,816	15.1
Negri Sembilan	233,592	7,463	3.2	34,897	14.9	19,306	8.3	42,360	18.1
Pahang	46,712	1,747	3.7	12,070	25.8	6,289	13.5	13,817	29.5
Total F.M.S. ...	843,534	17,148	2.0	126,709	15.0	49,901	5.9	143,857	17.0
UNFEDERATED MALAY STATES :—									
Johore	(b) 325,747	12,721	3.9	23,559	7.2	22,300	6.8	36,280	11.1
Kedah (c)	126,588	4,194	3.3	27,011	21.3	17,429	13.8	31,205	24.6
Kelantan	25,793	4,716	18.3	2,719	10.5	3,941	15.3	7,435	28.8
Tengganu (c)	4,543	Nil	Nil	171	3.8	171	3.8	171	3.8
Perlis (d)	1,181	Nil	Nil	266	22.5	Nil	Nil	266	22.5
Total U.M.S. ...	483,852	21,631	4.5	53,726	11.1	43,841	9.1	75,357	15.6
Total MALAYA ...	1,530,399	46,582	3.0	210,644	13.8	98,654	6.4	257,226	16.8

Notes :—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
 (b) Figures are for end December, 1932.
 (c) Registered Companies only.
 (d) Rentered quarterly.
 (e) Figures are as reported by estate managers.

N.B.—In returns from April, 1934, inclusive, column (7) has been included in columns (3) and (5) and the figures in the above summary for the period January to March inclusive have been amended accordingly.

MALAYA RUBBER STATISTICS TABLE I
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX,
FOR THE MONTH OF JUNE, 1934 IN DRY TONS.

State Territory	Stocks at beginning of month			Production by Estates of 100 acres and over		Production by Estates of 100 acres and over		Imports				Exports including re-exports				Stocks at end of month		
	Ports	Dealer	Estates of 100 acres and over	during January and month	January to July inclusive 1964	during January and month	January to July inclusive 1964	Foreign	Malay States & Labuan	Foreign	Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES :-																		
Federated States	...	2,133	7,840	13,329	81,647	4,832	61,545	Nil	Nil	Nil	Nil	10,385	1,950	106,486	32,294	...	9,732	8,869
Penang	...	1,113	2,671	3,554	30,439	3,613	27,911	Nil	120	Nil	268	1,275	2,671	11,353	47,577	...	1,914	2,281
Malacca	...	289	1,674	2,814	19,186	1,348	10,627	Nil	Nil	Nil	Nil	1,620	2,176	10,326	20,000	...	1,949	1,970
Celanis	...	80	13	18	99	40	235	Nil	Nil	Nil	Nil	50	Nil	343	...	...	41	10
Kelantan	...	180	138	247	1,598	436	4,915	Nil	Nil	Nil	319	79	554	638	6,300	...	55	50
Trengganu	...	55	50	282	1,791	141	791	Nil	120	319	268	13,568	10,834	128,161	128,893	...	12,261	13,948
Total Malay States	...	6,750	12,131	20,567	130,047	10,452	108,592	Nil	120	319	268	13,568	10,834	128,161	128,893	...	12,261	13,948
STRAITS																		
Settlements :-	...	1,051	1,418	2,518	9,330	1,342	...	Nil	Nil	4	Nil	2,341	...	23,735	...	...	2,260	803
Malacca	...	136	448	598	4,060	202	...	Nil	Nil	Nil	119,361	7,307	...	17,637	...	...	1,054	490
Province Wellesley	...	42	77	115	753	64	16,325	Nil	Nil	Nil	16,993	...	...	...	...	...	26	138
Penang	...	2,990	14,880	27	115	86	64	3,573	...	...	...	...	...	...	...	2,834	14,476	13
Singapore	...	7,594	53,149	1,710	1,240	79	...	29,286	...	124,304	...	31,884	...	196,356	...	5,070	50,628	128
Total Straits Settlements	...	10,544	71,238	1,362	2,319	1,631	16,325	22,829	...	11,871	141,204	119,361	41,532	...	...	7,294	62,439	1,572
TOTAL MALAYA																		
		10,544	78,008	13,493	22,886	145,468	12,083	22,829	11,991	141,580	119,661	55,090	10,834	...	...	7,292	80,700	14,920

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber		Federated Malay States	S. Port	Penang	Province of Wellesley	Johore	Kedah
20		21	22	23	24	25	26
DRY RUBBER		8,682	41,861	10,783	3,289	1,343	215
WET RUBBER		1,070	9,262	3,693	51	571	124
TOTAL		9,752	50,023	14,476	3,340	1,914	349

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to July 1984
Singapore	40,108	273,800
Penang	10,902	88,468
Port Swettenham	3,677	39,433
Malacca	403	4,203
MALAYSIA	55,090	405,669

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	January to July 1984
Malay States	24,295	243,007
Straits Settlements	8,116	
MALAYA	27,321	243,367

Notes :—

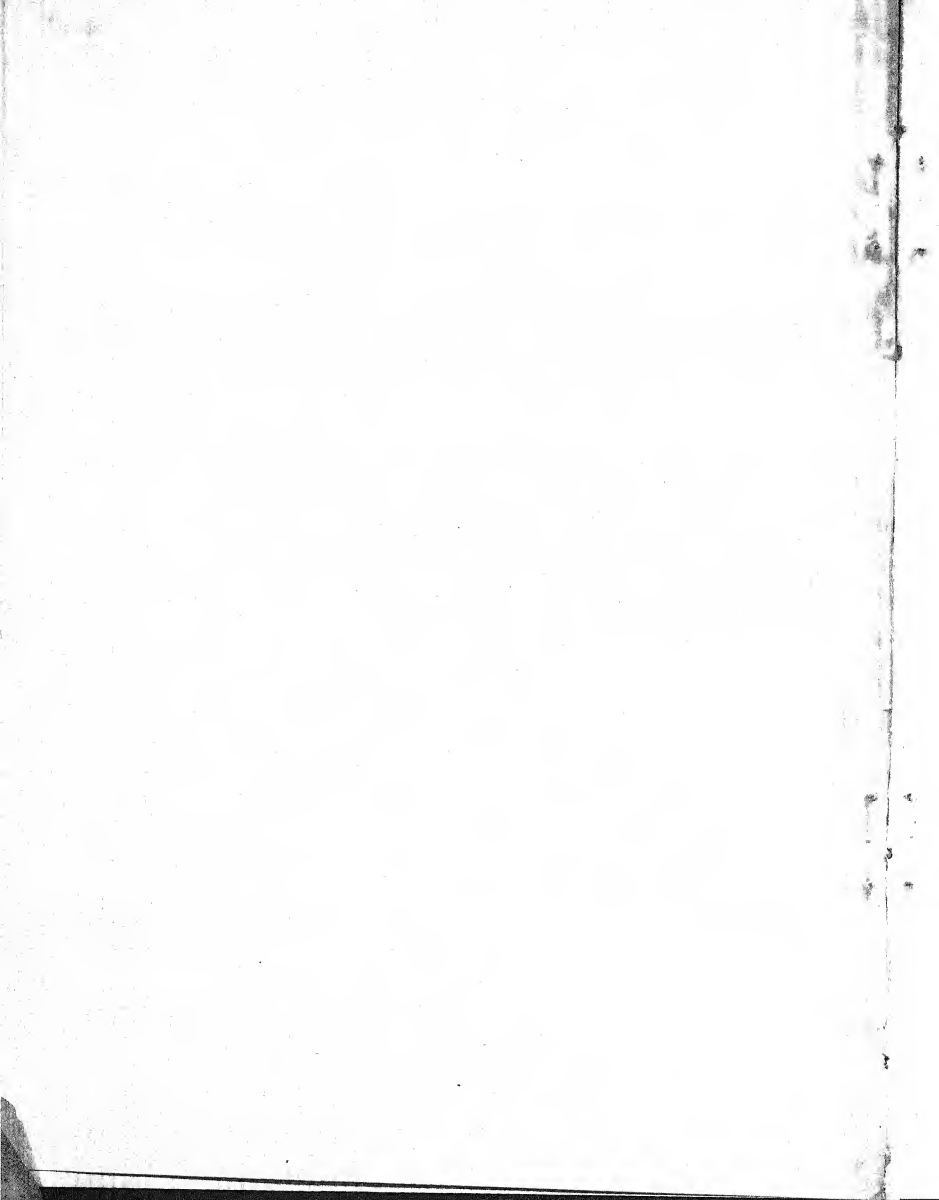
1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 400 acres is estimated from the formula : Production = Imports + Stocks at beginning of month + Exports + Stocks at end of month + Consumption, i.e., Columns [15] + [16] + [19] + [20] + [21] + [22] - [4] - [5] - [6] - [7] - [11] - [12]. For the Straits Settlements, Column [9] figures for Singapore and Penang islands represent rates of exports as shown by cash paid and for the mainland represent as previously purchased by dealers from local estates of less than 100 acres, reduced by 15%.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsolved cane, 15.7; wet sheet, 25% scrap, lumb, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Domestic exports are reported by the Customs Authorities for the Malay States and by the Registrars of Imports and Exports for Province Wellesley, Malacca, Dinghies and Labuan. For Singapore and Penang island domestic exports are represented by S.S. and R.M.S. tonnage as shown in the above, with certain omissions. The Report published by the Registrar-General of Statistics, S.S., and R.M.S. at Singapore on 24th August, 1924, is the basis of the figures in this Report.

METEOROLOGICAL SUMMARY, MALAYA, JULY, 1934.

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LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL						BRIGHT SUNSHINE.	
	Means of		Absolute Extremes			At 1 foot	At 4 feet	Total.	Most in a day.	Number of days.				Total.	Daily Mean.
	A.	B.	Max.	Min.	Mean of A and B.	°F	°F	in.	mm.	Precipitation in or more than 1 in.	Thunderstorm.	Fog morning obs.	Gale force 8 or more		
Railway Hill, Kuala Lumpur, Selangor	90.6	71.7	94	68	81.1	94	68	84.2	84.9	4.28	108.7	1.21	15	210.85	6.80
Bukit Jeram, Selangor	88.3	72.3	92	70	80.3	92	70	83.8	85.6	5.41	137.4	1.43	9	242.50	7.82
Sitiawan, Perak	90.7	72.8	94	70	81.7	94	70	84.4	85.2	1.55	39.4	0.75	8	201.40	6.50
Tenerloh, Pahang	89.6	72.4	93	70	81.0	93	70	85.0	86.0	6.09	154.7	3.99	14	205.60	6.63
Kuala Lipis, Pahang	88.8	72.1	92	69	80.5	92	69	84.0	84.9	4.84	122.9	2.30	8	188.35	6.08
Kuala Pahang, Pahang	87.0	74.4	90	71	80.7	90	71	85.6	86.0	6.55	166.4	1.59	15	238.35	7.69
Kallang Aerodrome, Shore	86.4	76.5	90	71	81.5	90	71	81.7	82.9	10.19	238.8	2.00	15	190.85	6.16
Butterworth, Province Wel-	87.3	74.2	90	72	80.8	90	72	84.7	84.7	6.54	166.1	1.23	14	168.40	5.45
lesley	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bukit China, Malacca	84.8	73.8	87	70	79.3	87	70	83.1	83.9	9.83	249.7	3.16	10	214.45	6.92
Kluang, Johore	87.4	70.9	91	69	79.1	91	69	81.4	81.9	3.11	79.0	0.73	20	172.70	5.57
Bukit Lalang, Mersing, Johore	86.6	72.5	89	71	79.5	89	71	81.7	82.0	4.91	124.7	1.00	13	196.30	6.33
Alor Star, Kedah	87.4	74.2	92	72	80.8	92	72	81.7	86.4	12.36	313.9	2.93	21	182.90	5.90
Kota Bharu, Kelantan	89.2	73.6	93	71	81.4	93	71	84.8	85.2	8.57	217.7	2.59	14	218.35	7.04
Kuala Trengganu, Trengganu	88.5	73.4	91	70	80.9	91	70	83.7	84.8	6.30	160.9	3.51	15	221.10	7.13
HILL STATIONS.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fraser's Hill, Pahang 4208 ft.	74.2	62.5	68.3	78	60	69	64	71.3	71.9	3.61	91.7	1.49	12	181.95	5.87
Pahang Highlands	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Carleton Place, Tanah	72.5	55.6	64.1	76	48	69	62	70.1	69.7	3.49	88.7	1.17	15	130.10	4.20
Rata, Pahang 4750 ft.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Carleton Highlands, Rhodo-	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Carleton Hill, Pahang 5120 ft.	71.7	59.4	65.5	75	55	68	61	4.02	102.1	1.41	16	9	...	138.70	4.47

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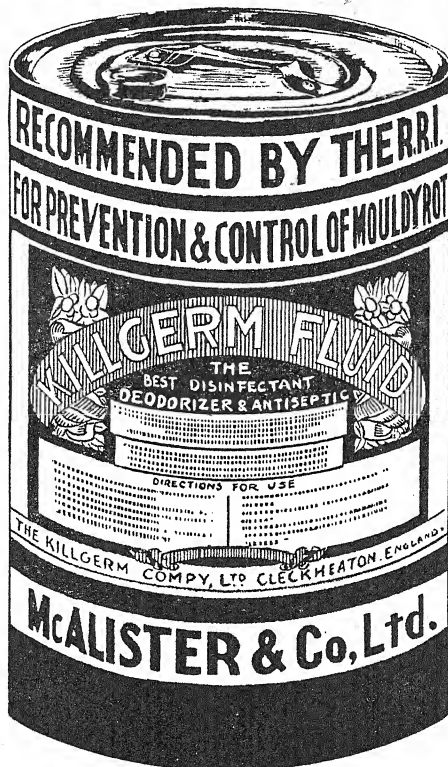
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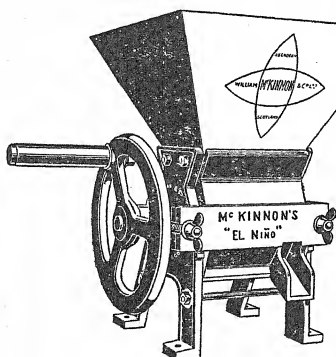
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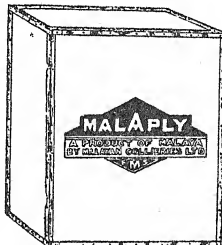
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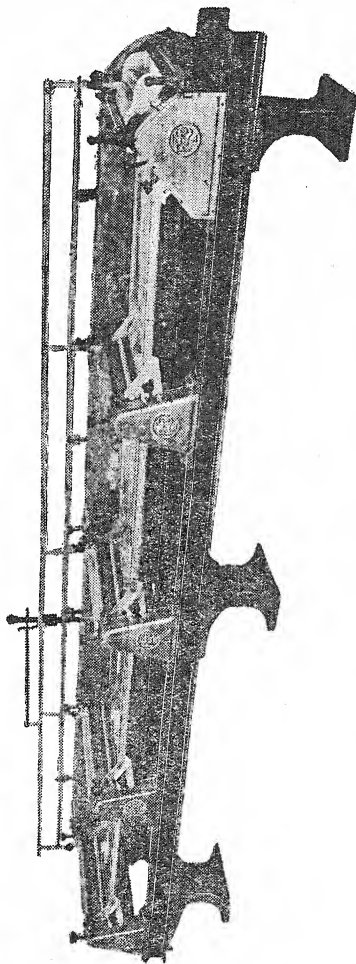
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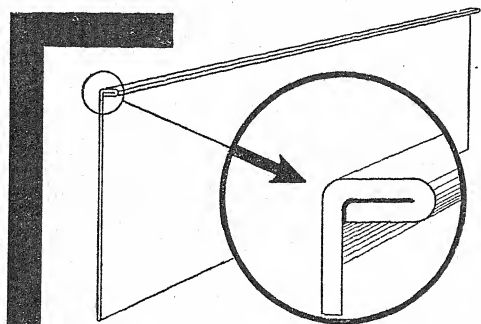
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THE Malayan Agricultural Journal.

OCTOBER, 1934.

EDITORIAL.

Malayan Soil Studies.

The fourth part of the series of Malayan Soil Studies, which is included in the present number, gives an account of field experiments conducted on quartzite valley soil which in the recent past had been under swamp conditions. The soil, which is fortunately not typical of any extensive areas in Malaya, is, however, such as is not infrequently occupied by Chinese squatters who mainly grow sweet potatoes and the like as food for pigs.

In the present instance, the land had proved absolutely infertile for rapidly-growing food or cover crops, although previously, after efficient drainage, it had supported crops of tapioca and derris and fibre plants.

The results of the present series of experiments shew that on such soil the application of artificial fertilizers produces no economic improvement in fertility, but that farmyard manure makes the production of short-term food crops possible, although even in such cases, yields are of a low order.

The substitution of green organic dressings for farmyard manure suggested itself in view of the difficulty of obtaining the latter in large quantities. Experiment proved, however, that such green dressings could not be relied on to give results equal to those given by farmyard manure, even with the addition of artificial fertilizers.

Malayan Rubber Statistics.

The review of statistics concerning the areas and production of rubber in Malaya in 1933, which will be found in this issue, is designed to present in concise form the position of the industry at the end of 1933. Accuracy on such a subject is an impossibility—the most that can be expected is an approximation to the truth. It is an undoubted fact, however, that the annual statistics have shewn constant improvement, especially in respect of an extension of the information obtained. For this result, the organisation of the Statistics Department and the liaison between the Departments of Agriculture and Statistics, are responsible, but one must also acknowledge the assistance of owners and managers of estates for the more prompt presentation of their returns.

The advent of the scheme of Rubber Regulation introduces a new phase in the compilation of statistics. The new organisation will be in possession of more complete data from individual estates and small holdings than has hitherto been available. The close collaboration of the Statistics Department with the work of the Controller of Rubber has suggested itself and it is hoped as a result, that more complete statistics than have hitherto been possible, respecting the year 1934, will become available early in 1935.

Rubber Control in the Netherlands Indies. An important abstract has been taken from this number at the last moment to make room for an abstract of the Nineteenth Report on Native Rubber Cultivation in the Netherlands Indies. In view of the introduction of control of rubber, and of the importance in this connexion of the position of rubber production in the Netherlands Indies, this authoritative report is of great interest. The full report, in English, will be found in the *Economic Bulletin of Netherlands India* published September 17, 1934.

One of the most significant results of the method adopted in the Netherlands Indies for the control of rubber exports is a decided improvement in methods of preparation of the product. This improvement may be to the disadvantage of certain interests, but it cannot be denied that it is to the advantage of the country of production and of the rubber industry as a whole. Hitherto, the native rubber from the Netherlands Indies has been vastly inferior to that produced on small holdings in Malaya. It is to be expected that although the recent improvements were dictated by the conditions arising as a result of restriction, they will prove to be of a permanent nature. In the meantime, the quality of rubber produced by small-holders in Malaya shews still further improvements—the result, very largely, of propaganda.

These developments must be welcome to the administrations of the countries concerned, for not only is it of advantage to the rubber industry as a whole that a high product should be marketed, but it is reflected in the well-being of the small producer, who receives an enhanced price for his product.

Original Articles. STUDIES IN MALAYAN SOILS.*

Part IV. Experiments on the Conditioning of an Infertile Soil.

BY
J. LAMBOURNE,
Assistant Agriculturist.

In Part II (*Malayan Agricultural Journal* Vol. XXI, October 1933, p. 471) of the Series, a description was given of small-scale pot and field experiments on a dark coloured quartzite valley soil which showed specific effects from the application of cattle manure. This manure, even in small applications which supplied nutrients in amount equal to those contained in normal dressings of artificial fertilizers, gave results markedly better than artificials. The soil on which these experiments were conducted was representative of a not inconsiderable area of flat land at the Central Experiment Station, Serdang, which in the past has been unsatisfactory with short-term food crops. Certain parts of the area exhibit the undesirable characters mentioned by Dennett (*Malayan Agricultural Journal*, Vol. XXI, p. 356) as likely to be found in valley soils of quartzite formation, *viz.* occurrence of free carbon and of sulphur-rich shales; others have shallow soil overlying a deep subsoil of exceedingly fine, closely packed sand, but considerable portions exhibit no obviously undesirable characters. The physical analysis of the soil is good, indicating clay or sandy loams and in chemical composition the soil is up to the average of quartzite hill soils.

Table I.
Analysis of Soil from Block 30, Serdang.

CHEMICAL		MECHANICAL	
	Per cent.		Per cent.
Moisture	5.2	Gravel	nil
Loss on ignition	7.5		
Carbon	1.53	Coarse sand	17.0
Nitrogen	0.087		
Lime	0.054	Fine sand	29.0
Iron and aluminium oxides	17.4	Silt	10.0
Potash (K_2O)	0.256	Clay	44.0
Phosphoric acid (as P_2O_5)	0.027	pH value	5.0
Magnesia	0.051		

* Parts I, II and III of this article appeared in *The Malayan Agricultural Journal*, Vol. XXI, Nos. 8 and 10 and Vol. XXII, No. 1 respectively.

When this part of the Plantation was opened up in 1923 the low-lying area was under light jungle and was swampy in wet weather, water up to three feet being encountered. It was noticed that the light jungle was of a peculiar nature containing many trees with stilt roots. No large trees were encountered, but as this is a mining district large timber of value may have been previously removed. The area might be described as supporting a swamp flora and many species were noted as occurring in similar situations elsewhere. Efficient drainage was provided at an early date.

Early cropping of the central part of the area with which we are here concerned gave no indication of infertility, but such planting was of fibre crops, derris, and tapioca and not of crops such as maize, tobacco and leguminous covers. It is not to be anticipated that one or two crops of fibre or derris could exhaust soil so completely as to inhibit growth, and evidence to the contrary is provided by tapioca which exhibited only a normal falling off of yield from 1924 to 1929. It is to be emphasised that when maize and similar crops are planted there is not merely poor growth, but practically complete absence of growth.

A number of field experiments have been carried out on this area since 1931, which may conveniently be grouped under four heads, *viz.*—

- A. Manurial trials with maize and tobacco.
- B. Green organic dressings experiment.
- C. Green organic dressings experiment plus artificial fertilizer.
- D. Soil reconditioning experiments with farmyard manure, lime, artificial fertilizers and green dressings.

Of these, A and D were suggested and the lay-out planned by the Director of Agriculture (Dr. H. A. Tempany, C.B.E.), while B and C were planned by the Chief Research Officer (Mr. W. N. C. Belgrave). Actual field supervision and reporting were carried out by Messrs. J. N. Milsum and J. L. Greig for the first year of series A and D. The remainder of the work was carried out by the writer.

Series A. Block 24. Manurial trials with Tobacco and Maize.

History of the Block.—After clean clearing in 1923 the land was tractor-cultivated and planted with Caraguata fibre which remained until 1928. Growth was good; no manure was applied. Tapioca was planted after ploughing in December 1928, and yields were below normal. This crop was removed in December 1929, the land remaining fallow and bare for ten months. Maize preceded by a dressing of 40 lbs. urea per acre was then planted, but failed completely.

Experiment I. Plots of 1/16th. acre were laid out to give four replications each of three treatments and a control; eight of the plots were planted with maize and eight with tobacco in April, 1931.

Controls	Received no manure.
N.P.K.*	= Nitrogen, phosphate, and potash.
F.Y.M. + N.P.K.	= Farmyard manure plus nitrogen, phosphate and potash.
F.Y.M.	= Farmyard manure.

The farmyard manure was applied at the rate of 20 tons per acre and the complete mixture (N.P.K.) was made up as follows:—

Sulphate of ammonia 20 per cent. N.	...	300 lbs. per acre.
Superphosphate 18/20 per cent. P_2O_5	...	200 "
Sulphate of potash 48 per cent. K_2O	...	100 "

The whole of the farmyard manure and half the artificials were applied before planting and the other half of the latter, three weeks after planting.

The maize germinated evenly over the plots and the tobacco plants appeared well established. After two months the plants to which F.Y.M. had been applied both with and without artificials had produced good growth of both maize and tobacco; those to which artificials only had been applied showed poor growth and no crop was obtained from either maize or tobacco, and in the case of the control the plants turned yellow and died when a few inches high.

Plates I and II show the appearance of the maize plots seven weeks after planting.

Table II.
Yield of Maize and Tobacco Leaf in 1931. Calculated to lbs.
per acre on the Means of two Plots.

Treatment	Maize lbs.	Tobacco Green Leaf lbs.
Control ...	—	—
N.P.K. ...	—	—
F.Y.M. with N.P.K. ...	485	3,686
F.Y.M. ...	428	3,370

Experiment II.—To ascertain whether any residual effect existed from the previous application of manures, the experiment was repeated on the same plots in April, 1932, after about eight months fallow. Each of the plots mentioned above was divided into two, one half in each case receiving similar treatment

* For the sake of brevity the initials N.P.K. are used throughout the article for Nitrogen, Phosphate and Potash, and F.Y.M. for Farmyard Manure.

to that previously given, with the difference that nitrogen and phosphoric acid were applied as calcium cyanamide and basic slag while the other half received no further treatment beyond cultivation. The change in form of the manure was due to information gained in the course of work by the Soils Division and described in Part II of this Series.

The actual mixture of artificials applied in this case was as follows :—

Calcium cyanamide	...	200 lbs. per acre.
Basic slag	...	225 "
Sulphate of potash	...	100 "

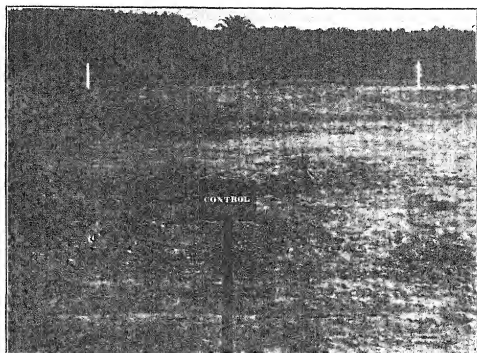
The whole of the farmyard manure and half the artificials were applied before planting and the other half of the latter, three weeks after planting.

Table III.

Yield of Maize and Tobacco Leaf in 1931. Calculated to lbs. per acre on the Means of two Sub-plots.

Treatments	Yield of Maize lbs.	Yield of Green Tobacco Leaf lbs.
Residues 1931 manures.		
Controls ...	4	—
Artificials only ...	44	176
Artificials + Farmyard Manure ...	704	1,984
Farmyard Manure ...	768	2,032
Residues from 1931 + Manures 1932.		
Control ...	8	—
Artificials only ...	208	2,400
Farmyard Manure + Artificials ...	1,472	4,848
Farmyard Manure ...	1,600	3,920

Discussion of Results.—From Table II it will be seen that on this type of soil after some years cropping, neither maize nor tobacco can be grown even with the addition of a complete mixture of artificial fertilizer. On the other hand, dressings of farmyard manure enable reasonable crops to be obtained which are not greatly increased by addition of artificials to the farmyard manure.

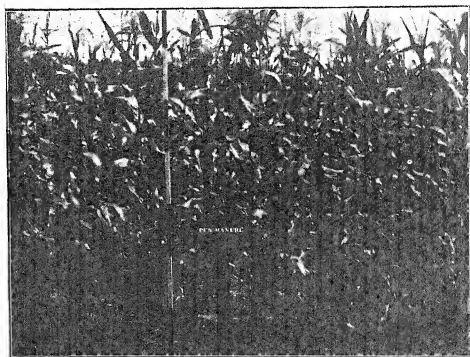


MAIZE. CONTROL PLOT.

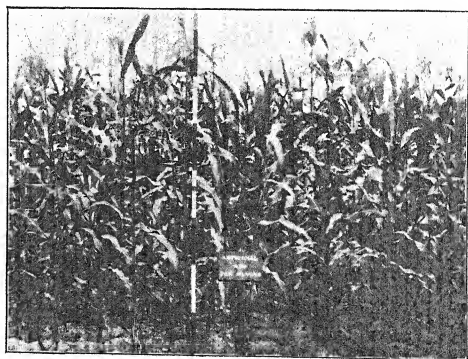


MAIZE. ARTIFICIAL MANURE PLOT.

PLATE II.



MAIZE. F. Y. M. Plot.



MAIZE. F.Y.M. AND ARTIFICIALS Plot.

It must, of course, be borne in mind that the actual quantities of nutrients added are not comparable; the artificial mixture used supplied approximately 60 lbs. nitrogen, 38 lbs. phosphoric acid (as P_2O_5) and 48 lbs. potash (as K_2O) while the farmyard manure supplied approximately 270 lbs. nitrogen, 450 lbs. phosphoric acid and 135 lbs. potash of which, under tropical conditions, a large part may be expected to be readily available.

Table III shows that there was considerable residual effect from farmyard manure and that the use of "basic" artificials resulted in the production of a fair crop of tobacco and some growth of maize. In Part II of the Series it has been shown that better results from "basic" manures are not peculiar to these valley soils, but extend to quartzite hill soils as well.

Series B. Green Organic Dressings Experiments.

The main conclusion arrived at as the result of the previous experiment is of limited practical application in Malaya, as in the majority of cases sufficient supplies of farmyard manure are unobtainable. It is possible that in certain States, notably Kedah and Kelantan where cattle rearing is more extensively practised, a solution might be found by organising the production of cattle manure on lines practised, for example, in Mauritius and some of the West Indian Islands, but in the generality of cases this is not feasible.

Accordingly, a further series of experiments was undertaken in order to ascertain to what extent the incorporation of organic matter in the soil could be successfully substituted for the use of farmyard manure in the process of soil rejuvenation.

Soil.—The area used for this experiment is in a ten acre block contiguous to that on which the manurial experiment described above was carried out. The soil on the whole is heavier, having from 50 to 60 per cent. fine fractions, and may be described as a dark clay loam.

History of the Block.—The history of the block is approximately similar to that on which the A series of experiments was carried out. It was opened at the same time, and was first planted in 1924 with sisal hemp, *Agave rigida* var. *sisalana*. By 1930 it had become unproductive and lay fallow from September, 1930 until December, 1931; in the latter month it was ploughed and then allowed to remain fallow again until April, 1932, when a cover crop (*Mikania scandens*) was planted with a small dressing of basic slag. This crop took root, but made very little growth and the area remained fallow, covered mainly with a poor growth of grass until the experiment to be described below was laid out.

Lay-out of the Experiment.

The area employed in this experiment comprises two acres divided into forty 1/20th. acre plots arranged in four blocks A—D of ten plots each; the following treatments were randomised in each series:—

Treatment

- | | | |
|-----|-----|---|
| No. | 1. | <i>Centrosema pubescens</i> dug in green six weeks before planting. |
| | 2. | <i>Centrosema</i> dug in green three weeks before planting. |
| | 3. | <i>Centrosema</i> dug in green one week before planting. |
| | 4. | Cut grass dug in green six weeks before planting. |
| | 5. | Cut grass dug in green three weeks before planting. |
| | 6. | Cut grass dug in green one week before planting. |
| | 7. | <i>Centrosema</i> laid on surface five weeks and dug in one week before planting. |
| | 8. | <i>Centrosema</i> laid on surface two weeks and dug in one week before planting. |
| | 9. | Cut grass laid on surface five weeks and dug in one week before planting. |
| | 10. | Cut grass laid on surface two weeks and dug in one week before planting. |

The different treatments were designed to test points which had arisen in the course of pot culture work described in Part II and III of this Series.

The *Centrosema pubescens* was obtained from other parts of the Station, and the cut grass from road sides. These green materials were applied to the plots at the rate of fifteen tons per acre.

Maize (var. Native Flint) was grown in the plots, the seeds being planted two per hole (21 lbs. per acre) at a distance of 15 inches in rows two feet apart.

The seeds germinated evenly, but subsequent growth was uneven and the majority of the plants turned yellow at the edges of the leaves; there were patches, however, in most of the plots where the seedlings grew normally. Wet weather was prevalent during the early growth of the plants and this may have affected them adversely, although drainage was good.

To save the plants from dying, it was decided to give a dressing of artificial manures to all the plots. The following mixture was applied between the rows and raked into the soil four weeks after planting: calcium cyanamide 1 cwt., basic slag 3 cwts., and sulphate of potash $\frac{3}{4}$ cwt. per acre.

The effect of the fertilizers was apparent in about a fortnight after their application, by which time the plants had a more healthy colour and commenced to grow with more vigour, although growth remained uneven in all the plots up to the time of harvest at the end of January, 1933.

The yields of maize are given in Table IV and will be discussed later.

Table IV.
Calculated Yields per acre Clean Maize.
Plots 1/20th acre.

Treatment	Block A.	Block B.	Block C.	Block D.	Means
	lbs.	lbs.	lbs.	lbs.	lbs.
1	165	120	480	220	246
2	235	300	440	80	264
3	360	440	360	320	370
4	40	520	560	520	410
5	240	420	200	120	245
6	340	540	480	510	468
7	760	420	360	200	435
8	160	500	480	540	420
9	300	80	80	620	270
10	260	320	80	260	230
Means	286	366	352	339	336 General Mean

The proportion of trash to maize was of the same order throughout.

The plots used in this experiment were subsequently ploughed in April, 1933, to turn in the grasses and weeds that had appeared in the plots after the maize was harvested. A dressing of basic slag at the rate of 2 cwts. per acre was applied to all the plots, and cow peas were planted on the 11th May, 1933, the sowing being at the rate of 21 lbs. per acre. The seeds germinated in a few days and grew fairly evenly on all the plots. Aphis attacked the plants when they were about 6 inches in height, but were controlled by spraying with kerosene emulsion. Two months after planting, the cow peas had made excellent growth on all the plots, irrespective of earlier treatment, but the crop of seeds was poor owing to the fact that a disease developed in the pods before they were ripe and caused considerable damage; rats were also troublesome. The yields of cow pea seeds are given in Table V, and from these figures it will be seen that there is considerable variation in yield of seeds from the different plots. The difference between the lowest-yielding plots: *Centrosema* dug in three weeks before planting, and the highest: cut grass laid on the surface five weeks and dug in one week before planting, is however, not significant because, on statistical examination, it has been found that a difference in yield of 114 lbs. of seed per acre between any two plots is required for significance.

Table V.
Calculated Yields per Acre. Each plot—1/20th. acre.
Cow Pea.

Treatment	Block A.	Block B.	Block C.	Block D.	Means
	lbs.	lbs.	lbs.	lbs.	lbs.
1	225	129	63	43	123
2	190	100	23	45	90
3	323	189	43	1	139
4	143	118	43	81	96
5	383	70	63	23	135
6	351	230	67	41	172
7	280	107	163	5	139
8	141	150	33	183	127
9	414	200	41	43	175
10	207	121	120	107	139
Means	269	141	66	57	134 General Mean

Difference between treatments required for significance = 114 lbs. per acre.

Discussion of Results.

The maize crop results were analysed by the Chief Research Officer and his comments are as follows:—

"Application of statistical method is scarcely fair in this experiment since growth was excessively uneven in any one plot. However, for what it is worth analysis gives a significant "Z" value and standard deviation of 115 lbs., roughly 30 per cent. of the mean, from which it follows that the smallest significant difference between any pair is 200 lbs."

"The average yields of maize from the different treatments arranged in order of merit are as follows:—

Treatment	lbs. per acre.
No. 6. Grass dug in green one week before planting ...	468
7. <i>Centrosema pubescens</i> laid down on the surface five weeks and dug in one week before planting	435
8. <i>Centrosema pubescens</i> laid on the surface two weeks and dug in one week before planting ...	420
4. Grass dug in green six weeks before planting ...	410
3. <i>Centrosema pubescens</i> dug in one week before planting ...	345

2.	<i>Centrosema pubescens</i> dug in three weeks before planting	...	264
1.	<i>Centrosema pubescens</i> dug in six weeks before planting	...	246
5.	Grass dug in three weeks before planting	...	245
10.	Grass laid on the surface two weeks and dug in one week before planting	...	230
9.	Grass laid on the surface five weeks and dug in one week before planting	...	220

"All that can be said with any degree of assurance is that the first five treatments, 3, 4, 6, 7 and 8 appear definitely better than the other five. The exclusion of the worst plot in each case does not appreciably alter the order of merit".

"Apart from the apparently aberrant case of No. 5, grass buried for three weeks before planting, it would appear that grass laid on the surface is useless, while *Centrosema* benefits by that treatment; further, *Centrosema* is useless if buried too long before planting. These apparently conflicting facts may be connected with the difference in nitrogen content, *Centrosema* containing approximately three times more nitrogen than does grass".

"The experiment was further complicated by the necessity for a top dressing of complete fertilizers to save the plants".

The yield of cow pea seeds was poor, but the growth of the crop was excellent.

Series C. Green Organic Dressings Experiment, plus Artificial Fertilizers.

This experiment follows as a natural sequence to the one described above and supplements it essentially by the application of different mixtures of artificial manures before sowing.

Soil.—The soil is a fairly even clay with 50 to 60 per cent. fine fractions.

History of the Area.—After being cleared of jungle in 1923 the area was cultivated with a tractor-plough. Tapioca was planted in November, 1924, and harvested in April, 1926. Horse gram, *Dolichos biflorus* was sown immediately afterwards on half the area; the other half received no treatment beyond the same cultivation. The horse gram was turned in during December, 1926, and a second crop of tapioca planted. This treatment was repeated and a third crop of tapioca planted which was harvested in 1929. Thereafter until April, 1933, the land lay fallow when the present experiment was laid out.

Lay-out of Experiment.

The area was divided into sixteen plots of one-tenth acre each arranged in a Latin Square. The treatments were as follows:—

- A. *Centrosema pubescens* turned in green six weeks before planting.
- B. *Centrosema pubescens* turned in green one week before planting.
- C. *Centrosema pubescens* laid on the surface for five weeks and turned in one week before planting.

D. Grass cuttings turned in green one week before planting.

These green dressings were applied at the rate of 15 tons per acre commencing on the 18th April, 1933.

Each of the plots to which green dressings had been applied was divided into four sub-plots of $1/40$ th. acre and received supplementary dressings of artificials treated as follows:—

1. Phosphorus as basic slag: 2 cwts. per acre.
2. Basic slag as in 1 + N as calcium cyanide: 1 cwt. per acre.
3. Basic slag as in 1 + potash as sulphate: $\frac{1}{2}$ cwt. per acre.
4. Phosphorus and nitrogen as in 2 + potash as sulphate: $\frac{1}{2}$ cwt. per acre.

Treatments were randomised and the artificial manures were applied one week before sowing gingelly. The seeds were sown on the 2nd and 5th June, 1933, in rows eighteen inches apart.

Owing to drought, growth was uneven and subsequently the plants were attacked with disease.

Discussion of Results.

The mean yields of gingelly seeds are given in Table VI. These figures have been examined statistically and differences found to be without significance. A difference of 80 lbs. per acre would be required in sub-plot means and this does not occur. These results do not confirm those of series B, but dry weather conditions, or the fact that the crop was different, may be responsible.

Table VI.
Organic Dressings Experiment with Manures.
Calculated Yields per acre of Gingelly Seeds.
Means of four Sub-plots.

Plot Nos.	1 P. lbs.	2 N.P. lbs.	3 P.K. lbs.	4 N.P.K. lbs.	Means lbs.
A	167.5	192.5	175.0	197.5	183
B	170.0	215.0	127.5	205.0	179
C	162.5	160.0	152.5	170.0	161
D	97.5	135.0	122.5	142.5	124
Means	149.4	175.6	144.4	178.7	162 General Mean

**Series D. Soil Reconditioning Experiments, Farmyard Manure, Lime,
Artificial Fertilizers and Green Dressings.**

This was an exploratory experiment designed to obtain some indication of the interaction of artificial fertilizers, lime, farmyard manure, and green organic dressings.

Soils.—The soil varies from a clay loam to a sandy clay loam with 40 to 60 per cent. fine fractions.

History of the Block.—The land was first opened in 1923 and after ploughing, various species of derris were grown until April, 1929. In May, 1929, the area was sown with *Tephrosia toxicaria*, which failed, apparently owing to the poor soil conditions. The land then lay fallow until the present experiment was laid down in April, 1931.

The area under experiment was five acres, divided into four plots of equal size and treated as follows:—

- | | |
|------------------------------------|-------------------|
| A — No treatment | (Control). |
| B — Lime | 2 tons per acre. |
| C — Lime as in B + farmyard manure | 20 tons per acre. |
| D — Farmyard manure | 20 tons per acre. |

Each of the above plots was divided into five sub-plots and the following artificial fertilizers were applied:—

- | | | |
|------------|---------|-----------------------------------|
| Sub-plot 1 | Control | (No further treatment). |
| 2 | N.P. | (Nitrogen and phosphate). |
| 3 | N. | (Nitrogen). |
| 4 | N.K. | (Nitrogen and potash). |
| 5 | N.P.K. | (Nitrogen, phosphate and potash). |

When the experiment was laid out the advantage of using basic manure had not yet been realised.

Lime was applied early in May and the farmyard manure about a fortnight later. The artificial fertilizers were applied at the beginning of June. The whole of the five acres was then divided into three strips across the above treatments and the strips were sown with *Crotalaria anagyroides*, *Centrosema pubescens*, and *Crotalaria usaramoensis*, respectively.

The *Crotalaria* spp. were pruned periodically as they commenced to flower and the prunings were laid on the surface *in situ*. The *Centrosema pubescens* was allowed to grow and cover the soil. *Crotalaria anagyroides* died out after the first pruning in October, 1931, and was resown during November of that year. These leguminous crops were allowed to remain for a period of about fifteen months at the end of which time they were turned into the soil.

Table VII.

Calculated Yields per acre of Green Material Produced by the
Leguminous Crops (irrespective of artificial manures).
Means of five Sub-plots.

Treatment	<i>C. anagyroides</i>	<i>C. usaramoensis</i>	<i>C. pubescens</i>	Means.
	lbs.	lbs.	lbs.	lbs.
A. Control	10,231	13,036	2,396	8,554
B. Lime	11,971	10,288	12,995	11,751
C. Lime + F.Y.M.	61,788	44,018	42,203	49,336
D. F.Y.M.	64,269	46,443	31,799	47,504
Means of all plots	37,065	28,446	22,348	29,286 General Mean

Table VIII.

Calculated Yields per acre of Green Material from the Leguminous Crops
for the Different Artificial Manures.
Means of three Sub-plots.

Treatment	1 Control	2 N.P.	3 N.	4 N.K.	5 N.P.K.	Means
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
A. Control	10,299	10,109	5,651	6,579	10,133	8,554
B. Lime	9,227	9,631	8,549	12,094	19,255	11,751
C. L + F.Y.M.	42,348	46,250	52,207	51,530	54,347	49,336
D. F.Y.M.	52,171	49,466	47,496	42,810	45,575	47,504
Means of all plots	28,511	28,864	28,476	28,256	32,328	29,286 General Mean

Table IX.

Calculated Yields per acre of Green Material from the Leguminous Crops
Turned-in immediately before Sowing Gingelly.
Means of five Sub-plots.

Treatment	<i>C. anagyroides</i>	<i>C. usara moensis</i>	<i>C. pubescens</i>	Means
	lbs.	lbs.	lbs.	lbs.
A. Control	1,618	557	2,396	1,524
B. Lime	1,049	403	12,995	4,816
C. Lime + F.Y.M.	2,268	1,882	42,203	15,451
D. F.Y.M.	1,999	1,563	31,799	11,787
Means of all plots	1,733	1,101	22,348	8,394 General Mean

Table VIII shows the green material obtained over the 15 months period and in the case of *Crotalaria* spp. includes all prunings. The weight of *Centrosema pubescens* was obtained by calculation from the mean of ten samples taken from each sub-plot. Table IX shows the actual amount of green material turned in immediately before sowing.

Subsequent to turning in the green matter at the beginning of October, 1932, the whole area was given a dressing of basic slag at the rate of one cwt. per acre. Gingelly was sown towards the end of October, 1932, at the rate of five lbs. per acre. Unfortunately germination was uneven and the area was resown during the first week in November. The weather was exceptionally wet after resowing, but subsequent germination was even.

It was early apparent that the gingelly seedlings were stronger on the plots to which farmyard manure was applied in 1931. It must be pointed out that owing to the effect of the farmyard manure, larger amounts of green material had been turned in on such plots. The plots which were treated with lime in addition to farmyard manure produced more vigorous plants than the unlimed farmyard manure plots. This was particularly noticeable in the *Centrosema pubescens* plots. On the plots which received no farmyard manure growth was slow, but was better on the limed plots than on the controls.

The gingelly crop was harvested during the first week in February, 1933, three months after sowing, and the yields are given in Tables X and XI.

Table X.
Calculated Yields per acre of Gingelly Seeds and Trash.
Means of five Sub-plots.

Treatment	<i>Crotalaria anagyroides</i>		<i>Centrosema usaramoensis</i>		<i>Crotalaria pubescens</i>		Means	Means
	Stems and Trash	Clean Seed	Stems and Trash	Clean Seed	Stems and Trash	Clean Seed	Trash	Seed
	lbs. p. acre.	lbs. p. acre.	lbs. p. acre.	lbs. p. acre.	lbs. p. acre.	lbs. p. acre.	lbs. p. acre.	lbs. p. acre.
A. Control	490	127	540	98	370	84	467	103
B. Lime	814	214	956	307	998	329	923	283
C. L + F.Y.M.	2,415	564	1,543	624	3,482	814	2,480	667
D. F.Y.M.	1,159	206	758	206	943	175	954	196
Means of all plots	1,219	279	949	309	1,447	351	1,206	312

Table XI.
Calculated Yields per acre Gingelly Seed.
Means of three Sub-plots.

Treatment	1 Control	2 N.P.	3 N.	4 N.K.	5 N.P.K.	Means
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
A. Control	96	76	68	92	184	103
B. Lime	296	272	252	224	372	283
C. L + N.P.K.	640	624	652	708	712	667
D. F.Y.M.	252	204	168	164	192	196
Means of all plots	321	294	285	300	365	312

After harvesting, the land was again ploughed and basic slag at the rate of two cwts. per acre was applied subsequent to the planting of groundnuts. The soil was drawn up into ridges eighteen inches apart and the seeds sown at one foot apart on the ridges at the rate of 80 lbs. of unshelled nuts per acre. Germination was even over the whole area.

Growth was good on the plots that were originally supplied with farmyard manure, the lime plus farmyard manure plot being slightly better in appearance than the unlimed farmyard manure plots. The limed, and also the control plots, were poor in comparison, but the former were slightly better in appearance than the latter.

A number of plants died from the effects of what appeared to be slime disease, but the area was not badly affected. Rats were troublesome just before the crop ripened and considerable damage was done, more especially to the farmyard manure plots (A) and (B) where the foliage was thick and afforded cover for this pest. Poisoned baits were laid down in large quantities and although most of these disappeared, the rats remained troublesome until harvest, which took place at the end of July and beginning of August, 1933.

Table XII.
Calculated Yields per acre of Unshelled Groundnuts.
Means of five Sub-plots.

Treatment	<i>C. anagyroides</i>	<i>C. pubescens</i>	<i>C. usaramoensis</i>	Means
	lbs.	lbs.	lbs.	lbs.
A. Control	127	42	40	70
B. Lime	95	63	42	67
C. L + N.P.K.	521	368	314	401
D. F.Y.M.	394	326	292	337
Means of all plots	284	200	172	219

Table XIII.
Calculated Yields per acre of Unshelled Groundnuts.
Means of three Sub-plots.

Treatment	1 Control	2 N.P.	3 N.	4 N.K.	5 N.P.K.	Means
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
A	74	58	58	62	94	69
B	88	80	52	56	56	66
C	324	440	364	398	477	401
D	334	340	324	376	312	337
Means	205	229	200	226	235	218

Discussion of Results.

The figures in Table VII show that in the case of areas on which the two *Crotalaria* spp. were grown, farmyard manure alone gave slightly better yields of prunings than farmyard manure and lime. *Centrosema pubescens* appears to have derived benefit by the addition of lime and this was shown in the plot with lime alone where the cover was more complete than in the control plot.

The effect of artificial fertilizers has varied between plots, but the means of nitrogen only, nitrogen and phosphate, and nitrogen and potash are the same, while the complete mixture gave yields about 15 per cent. higher. It is doubtful whether the latter is significant.

The highest-yielding plot was that to which farmyard manure plus lime was originally applied and *Centrosema pubescens* turned in, the *Crotalaria usaramoensis* block being second, and *C. anagyroides* third. The means for all plots in the green manure blocks are also in the same order.

When the total weight of green material produced by the leguminous crops (Table VII) is compared with the total weight of the gingelly crop (Table X) there appears to be no correlation between green leguminous material produced and the yields of gingelly.

General Discussion.

With one exception all crops were low, and as Table XIV shows, even successive heavy dressings of cattle manure have failed to raise yields to those normally to be anticipated.

Table XIV.

Normal Crop lbs. per acre.	Series A.		Series B.		Series D.	Series C.
	(i)	(ii)	(i)	(ii)		
Maize 2000-2500	485 (max)	1600 (max)	468 (max) 336 (mean)			
Tobacco 7000-11000	3700 (max)	4800 (max)				
Gingelly 600					162 (mean)	312 (mean) 667 (max)
Cow pea 500				134		
Groundnut 1000- 1300						401 (max) 219 (mean)

It is clear however that by treatment with cattle manure or by a combination of phosphatic manure and green manuring it is possible to obtain crops of some sort on land otherwise absolutely infertile for rapidly-growing food or cover crops.

Of the two treatments, cattle manure is superior in respect of vigour of plant and residual effect. The enhancement of yield found in experiment D as a result of combining lime with cattle manure has been observed in pot experiments with other local soil types. This enhancement is not necessarily obtained with artificials and in some cases decreases as the result of liming have been noted.

In order to test the possibility that owing either to submergence (swamp conditions) in the recent past, or the fact that fallowing of dark-coloured soil might result in undue heating and partial sterilisation of the soil flora, pot culture experiments were carried out with gingelly and maize in which (a) very small quantities of cattle manure and (b) large dressings of the same manure sterilised by heating were applied. In the result (a) gave poor or no growth and (b) excellent growth, from which it follows that the bacteria carried by the manure do not play a part in its specific and marked effect.

Confirmation of the fact that the soil was not sterile was obtained by observations on nitrification.

The problem of this soil, like almost all dealing with the vexed question of fertility, must await further work for its solution.

Fortunately, areas of quartzite valley soil are not extensive, but such as exist are not infrequently occupied by Chinese squatters who mainly grow sweet potatoes and the like as green food for pigs. These crops are heavily manured with pig manure and it is clear that considerable caution should be exercised in interfering with this practice.

REVIEW OF MALAYAN RUBBER PLANTING STATISTICS

BY

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The following review treats of the rubber-planting industry in the Federated Malay States and Straits Settlements in detail, statistics for these areas being complete to the end of 1933. Similar data are not available for certain of the Unfederated Malay States, and in such cases it has been necessary to make use of the 1932 statistics. The publication of these statistics—although incomplete as far as certain States are concerned—is justified in view of the introduction of rubber regulation.

The information concerning estates of 100 acres and over has been compiled from the replies to a questionnaire submitted to each estate at the end of 1933, and from monthly statistics collected from each estate of 100 acres and over.

Data concerning holdings of under 100 acres are less complete, owing to the very large number of such properties, to the stage of literacy of the majority of the owners and to their diverse nationalities. Collection of anything approaching accurate statistics from small holdings would necessitate individual inspection, work which at present is quite beyond the resources of the Statistical Department. It should be possible in the present year to revise the data by collaboration with those responsible for the working of the new scheme for rubber regulation. The present statistics of areas of small holdings are based on data obtained during the application of the Stevenson Restriction Scheme, areas planted subsequently being reported to the Department by the Government Administrative Branch.

The information here given is grouped under four sections (i) Areas, (ii) Production, (iii) Prices, (iv) Labour.

(i) Areas.

Area Planted with Rubber.

The following table states the present position, as far as is known, regarding the distribution of rubber areas in Malaya. The differentiation of "tappable" and "young rubber" in the case of estates of 100 acres and over is compiled from statements made by individual estates. In the case of small holdings, young rubber is taken to be rubber plants planted in the year 1925, or in any subsequent year. This basis conforms with the Federated Malay States Enactment to regulate the production and export of rubber.

Table 1.

Total Area in Malaya planted with Rubber Trees: end of 1933.

State or Territory	Estates of 100 acres and over		Estates of under 100 acres		Total Planted Area
	Tappable.	Young rubber.	Tappable.	Young rubber.	
	acres	acres	acres	acres	acres
Perak ...	253,227	20,793	221,556	30,192	525,768
Selangor ...	310,003	32,475	138,833	16,687	497,998
Negri Sembilan ...	233,592	40,607	66,880	15,279	356,358
Pahang ...	46,712	20,178	57,829	18,435	143,154
Total F.M.S. ...	843,534	114,053	485,098	80,593	1,523,278
Dindings ...	7,368	360	7,279	388	15,395
Malacca ...	121,152	5,739	67,898	7,015	201,804
Penang Island ...	1,366	261	9,505	1,707	12,839
Province Wellesley ...	44,285	783	16,052	3,774	64,894
Singapore ...	28,842	1,511	12,469	312	43,134
Total S.S. ...	203,013	8,654	113,203	13,196	338,066
			Total area estates of under 100 acres at end 1932.		
Johore* ...	325,747	132,217	396,725		854,689
Kedah* ...	114,551	80,157	106,460		301,168
Kelantan ...	25,793	6,688	58,789		91,270†
Trengganu ...	4,543	274	20,000		24,817
Perlis ...	1,181	339	3,687		5,207†
Total U.M.S. ...	471,815	219,675	585,661		1,277,151†
TOTAL MALAYA ...	1,518,362	342,382	1,277,751		3,138,495†

* Complete returns in respect of the year 1933 have not yet come to hand. The figures here given are therefore those of 1932. For estates of under 100 acres in the Unfederated Malay States, 1932 figures are here given in the absence of returns for the year 1933.

† These figure may disagree slightly with those published in the *Rubber Statistics Handbook*, 1934.

From the above, it will be seen that of the total area planted with rubber trees in Malaya, nearly 41 per cent. is contained on estates of under 100 acres each.

It is estimated, but there is no direct statistical evidence to support the statement, that the area of rubber on estates of between 25 and 100 acres is over 300,000 acres or about 10 per cent. of the total area. These figures are important because field observations indicate that the quality of tapping on such holdings is equal to that in the larger estates.

Newly Planted Areas.

The total area of rubber in the Federated Malay States and Straits Settlements as shewn above exceeds the previous year's return by 12,353 acres. Part of this increase is due to areas which have been recorded for the first time. On estates of 100 acres and over, 4,187 acres in the Federated Malay States and 374 acres in the Straits Settlements were planted during the year, and the area abandoned or destroyed during this period was 1,755 and 267 acres respectively. On small holdings, 2,092 acres were planted in the Federated Malay States and 1 acre in the Straits Settlements.

Reserve Land.

In view of the condition laid down in respect of rubber regulation that no new areas shall be planted with rubber, it is of interest to note that the area of reserve land held by the estates of 100 acres and over at the end of 1933 was 171,201 in the Federated Malay States and 21,099 acres in the Straits Settlements of which, however, 11,444 acres are known to be swamps, building sites or land otherwise unsuitable for rubber planting. Similar figures for the Unfederated Malay States are not available, but those of 1932 were 196,618 acres. The reserve land held by estates in Malaya is therefore about 14 per cent. of the area already planted.

Number and Size of Estates.

There is a total of 2,332 estates of 100 acres and over in Malaya. The distribution is shewn in Table 2.

Table 2.
Number and Size of Estates of 100 acres and over.

Size of Estates	Federated Malay States		Straits Settlements		Unfederated* Malay States		Total*	
	No. of estates	Total acres	No. of estates	Total acres	No. of estates	Total acres	No. of estates	Total acres
Over 5000 acres	14	104,372	5	34,689	1	7,943	20	147,004
Between 1000—5000	302	552,797	49	106,966	10	19,201	360	678,964
" 500—1000	235	169,199	42	28,840	7	5,444	284	203,483
" 100—500	594	131,219	193	41,172	29	6,230	816	178,621
Total	1,145	957,587	289	211,667	47*	38,818*	1,480*	1,208,072*

* Excluding Johore and Kedah for which States no figures are available.

Nationality of Ownership.

With very few exceptions, areas of under 100 acres each are Asiatic-owned. The most recent returns concerning estates of over 100 acres each are shewn in Table 3.

Table 3.
Nationality of Ownership of Estates of 100 acres and over.

Nationality of Ownership	Federated Malay States		Straits Settlements		Unfederated Malay States		Total	
	No. of estates	Total acres	No. of estates	Total acres	No. of estates	Total acres	Total acres	No. of estates
European	666	813,011	83	142,541	227	438,485	976	1,394,037
Chinese	311	100,582	154	54,094	519	202,266	984	356,942
Indian	134	30,366	41	11,008	92	21,695	267	63,069
Others	34	13,628	11	4,024	60	59,188	105	76,840
Total	1,145	957,587	289	211,667	898	721,634*	2,332	1,890,888*

Thus it is seen that in Malaya, with a total of 3,168,639† acres under rubber, 1,774,602 acres or 56 per cent. are owned by Asiatics.

Constitution of Estates.

It has been somewhat difficult to determine in some cases whether particular limited liability companies are non-Asiatic or Asiatic-owned. In some cases it has been possible to determine this point by personal knowledge, in other cases the nationality of the majority of directors has been the deciding factor and again in other cases it was decided by the country in which the company is incorporated. It will be realised therefore, that many cases of uncertainty remain, but such doubtful cases cannot materially influence the total. Private owners are those who hold the lease direct from Government. Table 4 summarises the information and demonstrates the enormous preponderance of planted rubber owned by limited liability companies over that owned by private individuals.

* These figures do not agree with those given in Table 1, having been compiled subsequent to the 1932 figures included therein and prior to the end of 1933.

† This figure is based on Table 3 and not on Table 1.

Table 4.

Nationality of Ownership of Estates of 100 acres and over in Malaya.*

Nationality of Ownership	Limited Liability Companies		Private Limited Liability Companies and Privately Owned Estates.		Total	
	No. of estates	Total acres	No. of estates	Total acres	No. of estates	Total acres
European	610	924,493	163	63,913	773	988,406
Chinese	18	14,268	461	143,128	479	157,396
Indian	—	—	178	42,794	178	42,794
Others	10	6,613	40	12,863	50	19,476
Total	638*	945,374*	842*	262,698*	1,480*	1,208,072*

Budgrafted Areas.

The area of budgrafted rubber trees in Malaya has assumed a position of considerable importance during the past two or three years. Of a total planted area in the F.M.S. and S.S. of 93,934 acres, no less than 86,142 acres are owned by non-Asiatics. Total production of rubber from these areas has been small up to the present, for only 6,141 acres were tapped during 1933. The area planted during the year 1933 amounted to 3,476 acres, of which 3,318 acres are in the Federated Malay States. Relative figures cannot be given for the whole of Malaya owing to the absence of complete returns from the States of Johore and Kedah. Table 5 gives a summary of information concerning the distribution of budgrafted areas.

Areas out of Tapping.

The very low price of rubber during the year resulted in a large area of rubber being thrown out of tapping. It is probable—but not an invariable rule—that the areas not tapped were those from which low yields were to be expected. It has also to be remembered that low prices were responsible for the fact that many areas of rubber trees that had reached a tappable size were not opened up.

As the price of the commodity improved during the year the area of tappable rubber trees not tapped decreased. It was very noticeable that small-holders were more adaptable to the varying conditions of the market; an increase in price had an immediate effect on production, while local factors—such as padi planting—exercised an influence on the area tapped in any one period.

In the following table (6) the percentage of rubber untapped is based on the acreage of tappable rubber as at the end of 1932; *viz.* large estates in Malaya

* Excluding Johore and Kedah, for which States no figures are available.

Table 5.
Area of Rubber Trees Budgrafted, end 1933.

State or Territory	Budded rubber at end 1933	Budded rubber planted out during 1933	Tappable area of budded rubber at end 1933	Budded rubber being tapped at end 1933	Budded rubber immature at end 1933
	acres	acres	acres	acres	acres
Perak ...	12,947	1,573	2,963	1,221	9,984
Selangor ...	21,993	464	5,143	2,399	16,850
Negri Sembilan ...	39,043	97	11,289	630	27,754
Pahang ...	15,179	1,184	2,914	1,562	12,265
Total F.M.S. ...	89,162	3,318	22,309	5,812	66,853
Straits Settlements	4,572*	158	1,039	329	3,533
Johore ...	50,463§	not known	5,400‡	not known	45,063‡
Kedah ...	17,667†	"	12,986	"	4,681
Kelantan ...	2,695	—	73	—	2,622
Total U.M.S. ...	70,825	—	18,459	—	52,366
TOTAL MALAYA ...	164,559	—	41,807	—	122,752

1,486,181 acres. The figures for small holdings refer only to the F.M.S. and S.S. and are based on a tappable area of 510,500 acres in the Federated Malay States and 121,000 acres in the Straits Settlements.

The area of tappable rubber untapped on small holdings was estimated by means of counting the number of holdings out of tapping along the sides of main roads; the percentage number of holdings untapped was then applied to the known total area of rubber in each District. For these observations, the holdings on either side of over 700 miles of road are examined quarterly. While it is not claimed that the method will give accurate results, it is evident that it supplies a useful index figure and is an approximation of the actual area out of tapping.

* Of which 3,300 acres are in Malacca, 790 acres in the Dindings and 439 acres are in Province Wellesley.

† Returns from Kedah not yet complete. Figures here given are those reported at end of 1932.

§ Returns from Johore not yet available. Figures here given are those reported at end of 1932.

‡ Estimate.

Table 6.
Areas out of Tapping in Malaya 1933.

Month	Estates of 100 acres and over in Malaya		Holdings of under 100 acres				Average price of Rubber in Singapore cents per lb.
	Acres of tappable rubber not tapped	Percent. of total tappable rubber	Federated Malay States		Straits Settlements		
			Acres of tappable rubber not tapped	Percent. of total tappable rubber	Acres of tappable rubber not tapped	Percent. of total tappable rubber	
January	319,918	21.5	133,000	26	48,600	40	6.76
February	328,034	22.1					6.23
March	326,843	22.0					6.09
April	327,378	22.0					6.94
May	314,664	21.2	70,000	14	27,700	23	9.05
June	306,636	20.2					10.83
July	292,609	19.7					12.65
August	280,029	18.8	49,000	10	17,600	15	12.32
September	273,225	18.4					12.05
October	267,921	18.0					12.84
November	258,587	17.4					13.19
December	247,746	16.7	45,000	9	14,000	12	13.60

For comparison of area out of tapping with the price of rubber, the average monthly price of rubber is shewn in the last column in the above table.

The greater influence of the price of rubber on production from small holdings is also shewn in Table 7.

(ii) Production.

The total production of rubber in Malaya in 1933 amounted to 460,743 tons, of which 220,639 tons, or 47.9 per cent. were from holdings of under 100 each. The detailed monthly production figures are shewn in Table 7.

Production Rate.

The production of rubber on estates of 100 acres and over, based on the area actually tapped, averaged 456 lbs. per acre in the Federated Malay States and 423 lbs. per acre in the Straits Settlements. Corresponding figures for holdings of under 100 acres were 463 lbs. per acre and 546 lbs. respectively. The high figure for production rate on small holdings in the Straits Settlements is

Table 7.
Production of Rubber in Malaya 1933.

Month	Estates 100 acres and over	Holdings under 100 acres	Total
	tons	tons	tons
January	19,716	16,089	35,805
February	18,763	12,786	31,549
March	17,080	14,798	31,878
April	17,202	14,851	32,053
May	19,392	18,346	37,738
June	20,550	18,955	39,505
July	20,293	21,092	41,985
August	21,356	19,672	41,028
September	20,422	19,415	39,837
October	21,423	19,986	41,409
November	21,545	20,299	41,844
December	23,269	21,936	45,205
TOTAL	241,011	218,825	459,836

largely due to the high yield returns for December 1933 which are so high and inexplicable that they must be accepted with reserve.

The rates of yield from small holdings in the Federated Malay States and Straits Settlements are higher than those from the estates of 100 acres and over and confirm figures of a similar nature published in past years. Further confirmation of the yield per acre from small holdings was obtained by Meads,* who took records of 75 small holdings distributed throughout the country and found a yield at the rate of 477 lbs. per acre.

(iii) Prices.

The price of rubber rose steadily from May onwards, largely on the expectation of some form of restriction of production or exports. The average monthly Singapore prices of standard smoked sheet and the average prices for small-holders' rubber of various grades in Singapore and Penang are given in Table 8. Details of prices in Districts are now published monthly in *The Malayan Agricultural Journal*.

* Meads, H. D.—"Bark Consumption and Bark Reserves on Small Rubber Holdings in Malaya", Special Bulletin, Department of Agriculture, S.S. and F.M.S. Economic Series No. 4, 1934.

Table 8.
Market Prices of Rubber from Small Holdings, Malaya 1933.
(Dollars (S.S.) per picul of 133½ lbs.).

Month 1933	Singapore			Penang
	Smoked Sheet	Unsmoked Sheet	Scrap	Unsmoked Sheet
January	8.00	7.00	3.20	—
February	4.00—8.00	3.00—6.80	1.00—4.00	—
March	7.60	6.80	2.50	—
April	7.80	6.80	2.70	8.60—6.20
May	11.80	11.00	5.00	7.00—10.30
June	13.50	12.25	5.00	11.20—14.00
July	17.50	16.00	7.00	12.00—18.40
August	15.00	14.00	6.00	13.00—15.50
September	15.00	14.00	5.50	11.50—13.50
October	15.50	14.50	5.00	12.60—14.40
November	16.50	15.00	5.00	12.60—14.20
December	16.50	15.50	5.50	13.30—14.60

(iv) Labour

Returns have been rendered to the Statistics Department by estates of 100 acres and over respecting the labour force employed at the end of 1933. The total labour employed on rubber estates in the Federated Malay States is 124,500, of whom 85,900 are Indians and 33,400 Chinese. Dependents of this labour force resident on estates are 47,600, of whom 43,550 are Indians and 2,800 Chinese. Of the Indian dependents 34,100 are children.

Corresponding returns from rubber estates in the Straits Settlements give:—Labour force 25,500 of whom 15,000 are Indians and 5,400 Chinese and 3,700 Malays: dependents 8,900 of whom 7,000 are Indians (including 5,700 children).

Similar figures for the Unfederated Malay States are not yet available, but from such returns as have been received, it is noted that the proportion of Malays employed is much higher than it is elsewhere in the Peninsula.

Information respecting the labour force employed on holdings of under 100 acres would be interesting but is impossible to collect. In the following

table (9), shewing the number of labourers employed per 100 planted acres of rubber, on estates of 100 acres and over, the first column gives the nationality of owners, subsequent columns shewing the nationality of labour employed by each group of owners.

Table 9.
Number of Labourers employed per 100 planted acres of Rubber
December 1933.

OWNER OF ESTATE	EMPLOYEES					
	Indian Labourers	Chinese Labourers	Javanese Labourers	Malay Labourers	Other Labourers	Total Labourers
STRAITS SETTLEMENTS :—						
Non-Asiatic	9.46	1.22	.39	.94	.14	12.15
Chinese	1.18	6.07	.80	3.72	.10	11.87
Indian	8.39	3.24	.42	.26	—	12.21
Others	2.73	5.26	3.38	3.19	—	14.56
FEDERATED MALAY STATES :—						
Non-Asiatic	10.20	2.70	.18	.17	.03	13.28
Chinese	1.20	9.10	.28	.75	.02	11.35
Indian	6.77	5.97	.22	.62	—	13.58
Others	1.98	8.95	.46	2.30	—	13.69

THE COLOURED SCUMS OF PADI FIELDS.

BY

W. N. SANDS,

Principal Agricultural Officer, Kedah.

Early in each season after cultivation has been started in the flooded padi fields, coloured scums appear on the surface of the water. The colours range from bright green to brick-red and very striking effects are produced over large areas, especially during periods of sunshine.

The colours are not due to mineral salts, or other matter in solution or suspension, but to myriads of minute motile algae. The phenomenon is particularly noticeable in fine weather because strong light attracts the organisms to the surface of the water, where, owing to their enormous numbers, they form a thin scum. This scum often drifts to the sides of fields with the surface currents caused by the prevailing breezes.

If a small quantity of water with green scum is collected and examined in bright light under a microscope, it is seen to contain several forms of minute, swiftly moving bodies containing chlorophyll. The most abundant species is an elongated, more or less fish-shaped one which has been identified by Professor M.O.P. Iyengar, University Botany Laboratory, Teynampet, Madras, as *Euglena proxima*, Dang. Two other smaller round forms also occur, but are not as abundant, and these also have been named by Professor Iyengar as *Trachelomonas volvocina*, Ehrenb., and *Trachelomonas intermedia*, Dang.

All of the species belong to the genera of lower plants which are grouped under the Volvocales. In this group there are two chief divisions: (a) that in which the plant consists of a few to many cells collected together and enclosed in a jelly-like envelope to form a family (coenobium) and (b), where it exists as a single cell and leads an isolated existence. The three species described belong to the latter division. Each consists of a single cell with a long fine whip-like appendage (flagellum) which protrudes through the gelatinous envelope at one end of it, and which by its active movement enables the alga to swim rapidly through the water.

The younger green stage of these algae is succeeded by the older dark-red one. This colour-change is due to some alteration in the character of the chlorophyll and is associated with the solidifying of the envelope and other changes to form the oospore, or resting stage, of the plant.

Abstract.

NINETEENTH REPORT OF NATIVE RUBBER CULTIVATION IN THE NETHERLANDS INDIES.

Second Quarter 1934.

*Prepared by the Bureau of Agricultural Economics of the Agriculture
Fishery Service of the Netherlands Indian Department of Economic
Affairs at Batavia, Java, and dated 12 September 1934.*

The Report covers the second quarter of 1934 and gives incidental data to the end of August 1934.

General Review.

The April reports on the progress of the restriction plans increased the confidence felt of speedy and favourable solutions of the problems raised in the negotiations. Rubber prices advanced until May 8, when the quotations for standard Java sheet in Batavia were 23 cents per $\frac{1}{2}$ kgm. Thereafter there was a reaction as a result of the publication of the provisionally fixed restriction percentages, which were lower than the rumours first spread had led the public to believe. As a consequence, standard sheet fell to 17 $\frac{3}{4}$ cents on 24 May. In June the price slowly recovered and the month closed with a quotation for Java standard sheet in Batavia of 21 $\frac{1}{2}$ cents per $\frac{1}{2}$ kgm.

The average for the first half of July was slightly higher and amounted to 21.8 cents and in the second half of that month the average was 22.1 cents. This increase in price continued during August and the first and second halves of the month shewed average quotations of 22.4 and 23.4 cents respectively.

At first the price of "blanket" rose more sharply than that of "sheet" and on May 8 the price relation was 84: 100. Thereafter, the relation changed in a way less favourable for "blanket". On 1 July the "blanket" price was only 72 per cent. of the price of standard sheet. This phenomenon was probably connected with the very large offers of wet native rubber made to the re-finishing factories. In June, a greatly diminished offer of native rubber was coupled with an improvement in the price relationship, so that the average quotation for June for "blanket" was about 77 $\frac{1}{2}$ per cent. of the average for "sheet". In July and August the percentage changed but little.

According to the international rubber agreement which came into force on 1 June, a basis quota of 358,000 tons of dry rubber was assigned to the Netherlands Indies. This was divided between the estate rubber and the native rubber in the proportion of 100 : 71½, a relationship that existed in 1929 between the exports of the two categories and is more favourable to the native rubber than the figures in any other subsequent years. In this way, the basis quota for native rubber was fixed at 149,000 tons, 169,000 tons, 188,000 tons, 198,000 tons and 205,000 tons in the years from 1934 to the end of 1938.

An individual restriction scheme was drawn up for the estates based on the data presented, and the standard production of the estates between which the export quota was to be divided was worked out from these data. It proved that this scheme was not applicable to the native rubber in the outer islands because in the first place, the necessary data for the calculations of basic standard productions were not available and the accumulation of these figures would have involved much time and costly work, but still more so because the potential production of the native rubber plantings was believed to be so great that if it were divided into the total quota permitted the individual amounts would have been very small. This would have implied that that portion of the population making its living principally by family-worked rubber plantations would have suffered at the expense of the owners of remote, often neglected plantations, or of plantations that are so large that they can only be worked by the aid of hired help; owners, in other words, who in the present circumstances cannot be regarded as genuine producers.

After prolonged conference and after taking into consideration all the difficulties that presented themselves, the Government decided to enforce the restriction on native rubber by imposing a special export tax, based on the experience that there existed a definite connexion between the price of rubber and the amount of native rubber exported. A reduction of the amount exported could therefore be brought about by manipulating the export tax.

This export tax was fixed for June at 10 cents per kgm. of dry rubber, with this stipulation, that the tax should be applied at once beginning on June 1 on all wet rubber (groups II and III of the export schedule). This postponement of 1½ months for the dry rubber was decided on in view of the time needed for the refinishing factories to prepare and dry off their end-product, blankets and bark-crepe.

Beginning on July 1 the basis of the export tax was raised to 16 cents per kgm. (to take effect for group I rubber on August 16), and on August 1 this basis tax was raised again to 20 cents (to take effect for Group I rubber on September 16). This same basis has been maintained for the month of September.

The effect of the export tax is shewn in the following table.

Exports of Native Rubber from the Outer Islands in Metric Tons.
(Calculated as the dry equivalent) Divided into Groups.

1934	Group			Total	Percentages of the total		
	I	II	III		I	II	III
January ...	2,341	322	12,630	15,293	15	2	83
February ...	2,296	346	12,033	14,675	16	2	82
March ...	3,239	430	17,077	20,746	16	2	82
April ...	3,740	411	16,944	21,095	18	2	80
May ...	4,877	991	22,223	28,091	17	4	79
June ...	5,182	556	11,830	17,568	29½	3	67½
July ...	6,750	554	9,038	16,342	41½	3	55½
August ...	5,618	304	6,538	12,460	45	2½	52½

(July and August provisional figures).

From the above table it may be deduced that the export tax is slowly having the desired effect, although the exports in August are above the allotted quota, which taking account of the internationally agreed restriction percentage of 0,0,10 and 10 in the months from June to September, should have been 11,250 tons in August.

The above figures also shew that the exports of dry rubber have increased at the expense of other grades. This is a result of the fact that with the high export tax, the advantages of the local preparation of dry rubber are much more obvious than formerly.

These advantages are temporarily increased because the period of 1½ months, which has been allowed for in fixing the export tax so as to give the re-finishing factories time for preparing and drying their end-product, proved to be quite ample for factories with well warmed drying sheds and for the people at large more than ample for the preparation of native sheets. The stimulus arising from this source in favour of preparing a dry product will, however, only be maintained as long as the tax must still be periodically raised.

In the past few months the rubber re-finishing factories have been working full time. In addition to this, reports are coming in from all sides concerning the importation of a large number of hand-mangles for preparing native sheets which are largely brought from Singapore and can be delivered for about f 15.00 each. This is especially taking place in the Western Division of Borneo, where many hundreds of mangles have been imported, with the result that in August the exports of wet rubber from that region were reduced to only 35 tons. The percentage of the total native rubber production exported as dry rubber was 17 per cent. from January to May, rose to 29½ per cent. in June, 41½ per cent. in July and 45 per cent. in August.

Another consequence of the imposition of the heavy export tax on native rubber has been that both the natives themselves and the exporters shew a general tendency to finish the product dryer than formerly; that is to say, to export the wet rubber with a smaller percentage of water in it than that on the basis of which it is taxed, thereby paying less tax on the finished article.

Since in this way the export tax was being avoided and its effect being negated so that more rubber was actually being exported than appeared in the statistics, a general control was instituted by examining samples to find the actual loss in washing of exported batches of native rubber. In this way it was possible, by continually revising the conversion percentages for expressing the wet rubber as the dry equivalent, to adjust the calculation of the amount of dry rubber exported and the tax to be imposed as nearly as possible to the actual conditions of affairs.

Inseparably bound up with the restrictive system of export taxes on native rubber is the principle that the returns from these taxes shall be employed for the benefit of the inhabitants of the rubber-producing areas. This tax is not a fiscal imposition but merely a means of securing restriction. A portion of the value of the products he wishes to export is withheld from the exporter, which can only be defended in principle if the amount so withheld is applied at once indirectly to benefiting the districts from which the product came.

With this in mind, a beginning was made in July by lightening the fiscal burdens of the inhabitants (principally payment of the commutation taxes for enforced labour on behalf of the Government and municipalities from the sums received for the export tax, lightening obligations incurred in the matter of ground rent, concessions in regard to income taxes and land taxes, and so forth). In addition to this, money was ear-marked for performing useful works, providing information for the agricultural groups of the inhabitants (principally in regard to the preparation of rubber), for sanitary measures, while some Divisions wished to use the money for introducing another restriction scheme.

In regard to this latter idea it may be remarked that in Bangka and Billiton and Riouw Free-area, districts in which many registered Chinese leasehold estates are to be found and the production possibilities of the rubber plantations are not so out of all proportion far above the export quota that might ultimately

be assigned to the various Divisions, earnest efforts were made to pass over as soon as possible to individual restriction. Such steps are also being considered in the Divisions of Tapanoei, Acheen and the estate area of Sumatra's East Coast.

In the months when rubber exports were large, especially from the larger rubber regions (Borneo, Djambi and Palembang) it was reported that there were still extensive areas of tappable rubber still untapped. During these months the family tapping system more and more gave place to the sharing systems, or to tapping by hired labour. Reports from the most recent months, however, indicate that in view of the reduced direct income to be derived from rubber growing the family tapping system is again coming into general practice.

The farming of foodstuffs held the full attention of the natives during the period being reviewed, which may be regarded as a good general sign, especially in these times of crisis, since in this way a certain degree of stability was guaranteed for the small farmer and the native community in general.

Local Reports.

Acheen and Dependencies.—In preparation for the possible institution of an individual restriction scheme, the native plantations in the Division of the East Coast of Acheen (the most important rubber district in the region) were registered. The number of *tappable* trees in the Sub-Divisions of Langsa and Tamiang of the above mentioned Division amounted to about 866,000 belonging to 2,907 owners.

The production figures for 150 native plantations were observed in order to calculate the average production per day. The result of this investigation was that 100 tappable trees yielded an average of 0.56 kgms. of dry rubber per tapping day.

Tapanoei.—The imposition of the extra export tax appeared to have but little influence on production during June and July. This was due to the fact that the tax on dry rubber, the grade almost exclusively produced in Tapanoei, only came into force in the middle of July.

Sumatra's West Coast.—In spite of the imposition of the extra export tax, the exports of rubber from Padang during June and July remained reasonably high, but fell off in August. The exports of native rubber by way of Sumatra's East Coast and Djambi increased in the second quarter of the year. The lower export tax in Pakan Baru and Djambi led to these places attracting a larger amount of the production of Sumatra's West Coast than usual. Beginning from the first of September the normal relationship will have been restored.

Palembang.—The exports from Palembang remained in May practically the same as the amount expected in April. There was no laying in of stocks; the monthly productions were regularly shipped. The smaller exports in June were partly due to the wintering of the trees. In the months of July and August the export tax and the work on the dry-rice fields exerted a marked influence on the already falling production.

The announcement that after May 1 strict measures would be taken against violations of the rubber assay regulations put an end to the practice of mixing scrap with the slabs and preparing slabs of too great thickness. The preparation of thinner slabs resulted in a diminution of the average water content.

Djambi.—The exports from Djambi fell off greatly in June to well below the average of the previous months. July and August shewed a still further fall. The reduction of the rubber tapping took place not only under the influence of the extra export tax but also because of the great demands on labour made by the ladang (dry rice) cultivation during this period.

The natives have already taken to making sheets to some extent, and the slabs exported are thinner and dryer than formerly.

Many iron hand-mangles were imported and this, coupled with the greater activity of the re-milling concerns and the preparation of dry sheets by the natives, resulted in an increase in the exports of dry rubber from 83 tons in April to 449 tons, 518 tons, and 335 tons in June, July and August respectively.

The exports from Djambi consist at the present moment almost entirely of wet rubber in the form of mixed wet products.

Riouw and Dependencies.—The exports from Indragiri declined in May, but increased again in July and August.

Bangka and Dependencies.—In April and May there was a marked decline in production, attributed to the harvesting of pepper, preparation of the land for dry padi planting and wintering of the rubber trees. According to rough estimates, during the first half of May some 80 per cent. of the tappable plantations were in production.

Western Division of Borneo.—Rubber production increased in the second quarter on account of termination of the rice harvest. In May 4,887 tons (dry equivalent) were exported. There was a falling off of production in some areas in June, and in August a marked diminution of the exports as a result of the imposition of the extra export tax.

Large scale production of dry rubber was begun.

All the re-finishing factories were working at full capacity. During the past few months there has been a great importation of iron hand-mangles from Singapore; Pontianak reports hundreds of mangles, Sambas an even greater number. As a rule the latex, after being strained, is now coagulated with acetic acid, rolled out into thin slabs in the mangle and dried several days in the sun. Then the half dried sheets are sold to the exporters who further prepare them in smoke houses to native smoked sheets and sell this product to Singapore, where there is a constant market for it.

The hand-mangles are often in the possession of the buyers who settle in the neighbourhood of a group of native plantations.

Southern and Eastern Division of Borneo.—This Division, with an export of 6,060 tons in May, created a record for the export from any Division in

this country in one month. A definitely greater activity was seen in the re-finishing industry. Exports during July and August were also at a high level.

In this Division, too, many hand-mangles were imported. There are plans for taking in hand the purchase and conversion of latex for preparing native smoked sheet on a large scale under the leadership and instruction of the Government.

Exports.

The exports of native rubber (dry equivalent in metric tons) from the Outer Islands to foreign countries during the first quarter of 1934 amounted to 50,714 tons, and in the second quarter to 66,754 tons, as compared with 13,420 tons and 25,597 tons for the first two quarters of 1933. The July and August 1934 exports (provisional figures) were 16,342 tons and 12,460 tons respectively.

Reviews.

Spices and Condiments.

*H. G. Redgrove. 340 pages, bibliography and indexes; 26 half tone and 17 line illustrations Sir Isaac Pitman and Sons, Ltd., London, 1933.
Price 15 shillings.*

The object of this book, according to the author, is to provide an accurate and comprehensive account of spices and condiments for the spice-user. Mr. Redgrove points out that since Ridley's book on spices was published in 1912, considerable advances in knowledge have been made. Further, Ridley's book is essentially one for the spice-grower while the present work deals particularly with the botanical sources and chemical constituents of spices.

The book is divided into six sections. Section (i) is concerned with the uses of spices in dietary and the means by which ground spices, essences and essential oils are prepared for flavouring food and other uses. The remaining sections deal with the various spices themselves. The author adopts as a means of classification, a system based on the part of the plant from which the spice is obtained. The plants described are therefore grouped in the following sections—(ii) rhizomes and root spices. (iii) bark spices. (iv) flower spices, (v) fruit spices, and (vi) seed spices. This system is chiefly useful to the spice-user. From a botanical standpoint it has disadvantages since, in certain cases, plants of close affinity are separated. Attention is drawn to the various distinctions made between spices and condiments. The author suggests the use of the term "condiment" to denote a spice, or other seasoning material, used in a particular manner *i.e.* added to food which has been served.

The agriculturist will find the book of considerable value since it provides a clear description of all spices cultivated together with their correct botanical status, uses, and chemical constituents. It is not a guide to cultivation but rather a clear and concise reference book of general information. Spices of especial interest in Malaya are as follows:—ginger, turmeric, cloves, chillies, pepper and nutmeg. All these thrive under local conditions and are produced commercially. Others grown in the experimental stage are: zedoary, *Curcuma zedoaria*; lesser galangal, *Alpinia officinarum*; cinnamon, vanilla, and cardamom.

The author states that Malaya, once celebrated for its spices, has in recent years turned to the cultivation of rubber, which, in the long run, has not proved as profitable as confidently predicted. The statement is probably correct but the inference is erroneous. Prices of most spices recently fell to a low level and in several cases *e.g.* cinnamon, cloves, and pepper, proved unremunerative owing to over-production. The majority of spice crops require considerable expenditure in cultivation and manuring, and crop at infrequent intervals. With a limited market and fluctuating returns, it has been a doubtful proposition for landowners to plant spices when rubber has often offered such excellent prospects. The future is more hopeful, since under existing legislation rubber may not be planted and attention will be directed to other crops which offer possibilities.

J. N. M.

Fodder and Feeding Stuffs in Malaya.

C. D. V. Georgi, 35 pp. Department of Agriculture, S.S. and F.M.S.,
Special Bulletin General Series No. 17, 1934. Price 50 cents.

Of late years it has become realised in an increasing degree that the feeding of animals is a process which requires knowledge and skill for its successful practice.

The rule of thumb methods which previously prevailed have become replaced by the computation of rations on a scientific basis; the principles underlying feeding are now well understood and it is possible by varying the ingredients of an animal's food to fit it with considerable exactness to the duty which it is required to perform.

Information on the subject is, however, not always available to the agriculturist and planter in Malaya; in this bulletin Major Georgi has described the general principles involved and has supplemented it by analytical data concerning the composition of foodstuffs which are ordinarily employed in this country.

Interest in animal husbandry in Malaya is gradually extending and as the country becomes more permanently settled it may be expected to increase still further.

The work will be found to be of practical utility by all who are interested in animal husbandry and who feel their need for a handy work of reference in relation to the feeding of stock. With the information in this bulletin, stock breeders should find it easily possible to compute rations for their animals and to arrange their purchases of feeding stuffs in such a way as to secure the best results.

H. A. T.

Departmental.

FROM THE DISTRICTS.

*Compiled by the Chief Field Officer from Monthly Reports
submitted by Field Officers.*

The Weather.

In Kedah, Province Wellesley, Penang and the northern Districts of Perak, more or less severe flooding was experienced during the opening period of the month, which tended to bring the average precipitation above normal. In all other parts of the country, more particularly in the inland areas where conditions were abnormally dry, the average rainfall was not maintained.

Remarks on Crops.

Rubber.—Compared with prices for the previous month, price quotations over the period under review show little change. Scrap, and similar low qualities for which there has been no recent demand, has been bought in many centres throughout the country at about \$15 to \$17 per picul.

Extremely wet weather in Kedah, Province Wellesley and the Krian and Selama Districts of Perak during the early part of the month, restricted tapping, and difficulty was experienced in these areas in obtaining sufficient rubber to cover coupons. In the Krian District the force of storms and flood was sufficiently severe to cause very extensive destruction of trees on both small-holdings and estates.

As the result of conditions favourable to the fungus development, the control of mouldy rot and other bark diseases was rendered difficult. The position was further aggravated in rice-producing areas by the incidence of the planting season.

In other centres, with the exception of Johore, where weather conditions more nearly approximated normal, conditions are reported to be satisfactory. Tapping systems are not extravagant, progress in general upkeep is maintained, and on many Chinese properties thinning out has been noted.

In Johore, however, tapping continues to be severe, and every effort is being made to increase production. Catch crops, such as gambier and pine-apples are being removed, and in some cases where arecanuts have been inter-planted with rubber, the former are being cut out and disposed of for fishing stakes.

The departmental organisation for the distribution of approved fungicides continues to receive an increasing and satisfactory measure of support.

A somewhat widespread infection of *Oidium Heveae* was reported from the Segamat District of Johore; with the onset of rains, however, it is probable that the disease will rapidly diminish.

Asiatic Rubber Instructors attached to the Small-holders Advisory Service which was inaugurated in July, have made very satisfactory progress in the areas where they are at present stationed. As a direct result of their instructional activity, the manufacture of rubber from small holdings is already showing improvement, and much useful information is being accumulated.

Rice.—Heavy rains in the northern States caused much flooding in rice-producing areas, more particularly in Kedah and the Krian District of Perak. Newly-planted seedlings were extensively damaged. The staff of the Department rendered much assistance in the collection and distribution of seedlings to areas where nurseries had been destroyed. As adequate reserves of well-grown seedlings were available to replace losses, no permanent damage is anticipated.

In the more important rice-growing areas of the country, planting has made good progress, and crops so far present a satisfactory appearance.

Conditions of growth in the Segamat District of Johore are good, although water shortage has been experienced and some rat damage sustained. The "sawah" (wet padi fields) competition in this District has aroused much interest. Rats and birds have been responsible for much damage in this District. In the Muar District, however, little interest has been taken in rice planting, and the area under cultivation will be considerably less than that of last season.

Coconuts and Copra.—There has been no price improvement over figures for the previous month, and in many centres copra manufacture as a small-holding industry has declined.

A local Malay-owned kiln in Province Wellesley has again obtained Penang f.m.s. price for copra produced.

In Perak, rain and the incidence of padi planting hampered copra production in the District of Krian. Small-holding copra in the Bagan Datoh District brought \$2.40 to \$2.60 per picul. A satisfactory selling arrangement has now been made for the disposal of good quality copra from this centre, the standard of the product being guaranteed by an officer of this Department.

Further developments in the erection of improved small-holders' kilns are reported from Johore. A large kiln is now in course of erection at Ringgit, and it is probable that the pattern will be copied by other local manufacturers.

Fruit.—Duriens and mangosteens are being harvested in Kelantan; jambus are cropping in the coastal areas of Johore and dukus in the Muar District. Machang, mempalam and jambu are in season in the Klang District of Selangor, and duriens, machang, mata kuching and rambutan are available in Pahang. Crops, however, are irregular and generally poor.

Tapioca.—In Kedah a further 802 acres were planted to this crop in the Kulim District.

Owing to the shortage of raw material a factory in the Segamat District of Johore is closing down; a large plant, however, is being erected on the Kluang—Mersing road to deal with the crop in that locality.

Tobacco.—Interest in this crop is being maintained in the Kuala Muda District of Kedah, Perak Central, Pahang East and the Kluang and Batu Pahat Districts of Johore.

Arecanuts.—It is reported from Johore that prices of arecanut produce have advanced, especially for "Iris" and "Kosi" qualities: supplies, however are short.

Pineapples.—All factories in Johore were closed down during the month. This off-season is being utilised for overhauling plant in readiness to commence the new season's operations during October-November.

In this State, small areas continue to be opened up for pineapple cultivation as a sole crop.

Padi Stations and Test Plots.

In Kedah, heavy and continuous rains checked the development of the plants in most of the plots at the Telok Changai Experimental Station, but subsequent dry weather led to an improvement. The Rantau Panjang Test Plot was flooded to a depth of 2½ to 3 feet for four days shortly after planting, but it is not thought that much permanent damage has been done. A total of 3,926 gantangs of selected padi seed and 84 large bundles of seedlings were distributed from departmental sources, and in addition, 4,842 bundles of seedlings were collected in the Kota Star District for distribution at Padang Lalang, to repair flood-damaged crops in that area.

Experimental areas in the Krian District of Perak were subjected to severe flooding which impeded progress. In most cases the crop was sufficiently robust to withstand the adverse conditions and no permanent damage has been sustained. With the subsidence of the water the planting programme was continued, and by the end of the month was nearing completion.

In other Stations and Test Plots, work has made satisfactory progress, despite in some cases the lack of adequate irrigation facilities.

Good progress continues to be made on new experimental areas in the course of development at Sungei Manik in Perak, Sungei Blat in Pahang and Panchang Bedina in Selangor.

Agricultural Shows.—The Department staged an instructional exhibit, and arranged lectures illustrated by lantern slides on subjects of interest and importance to small-holders at Shows held at Bentong and Raub in Pahang, Kuala Langat in Selangor and Mersing in Johore.

Rural Lecture Caravan.

A tour of the caravan in Pahang, which commenced during August, was completed on September 16th, important centres on the Pahang river and along the coast, and Pulau Tioman being visited. As usual, much interest was evinced and attendances were satisfactory.

DEPARTMENTAL NOTES.

Visit of the Acting Director of Agriculture to Kelantan and Trengganu.

At the request of the Kelantan Government the Acting Director of Agriculture visited that State from September the 3rd. to the 5th. inclusive, for the purpose of inspecting the Central Agricultural Station at Kota Bharu and the Pasir Puteh Padi Test Plots, reporting on the general agricultural work in progress and making suggestions for future developments.

On the conclusion of this visit he proceeded to the Besut, Kuala Trengganu and Kemaman Districts of Trengganu during the period September 6th. to 12th. inclusive in order to make recommendations at the request of the Government for the development of agricultural activities in that State.

Leave.

Mr. R. G. H. Wilshaw, Assistant Chemist, has been granted 24 days full-pay leave from 6 September 1934 to be followed by 4 months and 7 days leave on half-pay on the ground of ill-health.

DISTRICT AGRICULTURAL SHOWS.

Kuala Langat, Selangor.

After a lapse of six years, an Agricultural Show was held in this District at Morib on 23rd September, 1934. This is the third Show to be held in the Kuala Langat District.

Heavy rain fell in the morning which somewhat delayed the opening, which was performed by H.H. The Sultan of Selangor in the presence of a large gathering that included The Hon'ble the British Residents of Selangor and Negri Sembilan.

The Show was housed in temporary sheds, which were tastefully decorated, each *Penghulu* being responsible for one section.

All the sections were fully occupied with the exhibits, in spite of the fact that poor exhibits were rejected before the staging commenced. One of the most successful sections was that devoted to padi. Rubber exhibits were few in number, but of greatly improved quality.

The Department of Agriculture, the Rubber Research Institute of Malaya, the Health Department and the Infant Welfare Centre staged exhibits and demonstrations of an instructional nature.

A demonstration by the Malay Regiment and a display by four aeroplanes from the Kuala Lumpur Flying Club were the main items in an attractive programme of amusements which also included a physical strength display, fancy dress football match, a hockey match; and at night a Malay *ronggeng*, a *bangsawan* and a Tamil drama.

Besut, Trengganu.

The first Agricultural Show for the Besut District of Trengganu was held at Kampong Raja on September 6th, 1934.

Sections were provided for padi, fruit, vegetables, poultry, and arts and crafts and the general standard of the numerous exhibits was good. There were also some good samples of home-made coconut oil.

The Show was well attended and aroused much interest; it is hoped that another will be held next year when a better understanding of the object of such shows may be expected to lead to an increase in the number of exhibits.

Bentong, Pahang.

A District Agricultural Show was held, in conjunction with the annual buffalo show, at the Government English School, Bentong, on Sunday, 9th September. The opening ceremony was performed by the Hon'ble The British Resident of Pahang in the presence of a large audience.

The usual competitive sections were provided but although exhibits were numerous, the general standard of quality was only fair. It was unfortunate that exhibits were much too crowded which resulted in a large portion of them not been seen and rendered judging difficult.

The Department of Agriculture staged an educational exhibit of local interest and two Malay Officers were fully occupied in explaining the essential points of the exhibits. In the evening lantern lectures were given on poultry breeding and control of mouldy rot disease of rubber.

The buffalo show consisted of the winning beasts from the mukim competitions; some very excellent animals were exhibited.

Buffalo and Stock Show, Raub.

Of particular interest was the Buffalo and Stock Show held at Raub, on the 8th September.

Exhibits in the buffalo section were the prize-winning beasts from the mukim show and accordingly were of a high standard of quality.

Classes were also provided for goats, milking cows with calves, and poultry; the exhibits in the last section were definitely poor.

The Medical Department staged an exhibit dealing chiefly with child welfare and control of disease.

The Department of Agriculture staged an exhibit similar to the one at the Bentong District Show; a lantern lecture on poultry-keeping was given in the evening.

During the afternoon a buffalo timber hauling contest was held.

The Show was an undoubted success as was proved by the numbers of entries and the interest shown by local cultivators.

Statistical.

MARKET PRICES

September, 1934.

Rubber.—During September rubber failed to maintain its recent advance in price and at 24½ cents per lb. for spot loose in Singapore closed at 1¼ cents per lb. less than its opening price. The average price for the month in Singapore of Smoked Sheet equal to London Standard was 25.09 cents per lb. as compared with 24.8 cents per lb. in August. The average price for September in London was 7.41 pence per lb. and in New York 15.26 cents gold per lb. as compared with 7.4 pence and 15.37 cents gold respectively in August.

Weekly prices paid during September for small-holders' rubber at three centres are shewn in Table I.

Table I.

Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, September, 1934.

(Dollars per Picul.)

Grades.	Kuala Pilah,† Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.		
	6	13	20	27	5	12	19	26	5	12	26
Smoked sheet	30.70	30.58	29.00		30.12	30.12	29.46	28.84			27.70
Unsmoked sheet	26.92	24.68	27.14	27.09		26.69	25.92	26.04	26.50	27.09	
Scrap		15.00	15.00		15.00	15.83	16.00	16.50			16.30

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$3.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent. No purchases at Batu Pahat on 19th September.

† Kuala Pilah, 30th August, 1934. The price of unsmoked sheet should read \$28.22 and not \$20.44.

Palm Oil.—Prices for the whole month for the Malayan commodity are not available, but those for the beginning of September are shewn in the following table and indicate that the recent improvement in this market is being maintained. Basis 5 per cent. f.f.a.

Table II.

DATE 1934.	PALM OIL			KERNELS
	L'Pool/Holland/ Hamburg c. i. f. landed weights in bulk per ton £. s. d.	L'Pool/Continent c. i. f. per ton net in barrels £. s. d.	Halifax (Nova Scotia) c. i. f. landed weights per lb. Cents gold.	Fair Average Malayan Quality c. i. f. Landed Weight per ton on Continent. £. s. d.
September 5	12 0 0	14 10 0	—	7 0 0
	Later prices	not available.		

Copra.—The September prices of copra in Singapore continued almost unchanged at the present low levels. The sun-dried grade opened at \$2.90 per picul, to close at \$3, with an average for the month of \$2.93 as against \$3 in August. The mixed quality only averaged \$2.28 per picul as compared with \$2.40 in August.

Copra cake maintained its improved price and averaged \$1.77 per picul for the month.

Rice.—The average wholesale prices of rice per picul in Singapore during August were as follows:—Siam No. 2 (ordinary) \$3.13, Rangoon No. 1, \$3.16, Saigon No. 1 (long grain) \$3.17, as compared with \$2.78, \$2.77 and \$2.82 in July. Corresponding prices in August 1933 were respectively \$3.78, \$3.01 and \$3.47.

The average retail market prices in cents per gantang of No. 2 Siam rice in August were:—Singapore 23, Penang 24, Malacca 23, as compared with 22, 24 and 23 respectively in July.

The average declared trade value of imports of rice in August was \$3.03 per picul as compared with \$2.85 in July and \$2.93 in June.

Padi.—The price paid for padi at the Government Rice Mill, Bagan Serai, remained unchanged at \$1.50 per picul. A privately owned mill paid \$1.40 per picul. Prices per gantang ranged from 5 cents to 12 cents in various parts of the country.

Tea.—Malayan tea was quoted in London during August at from 11d. to 1s. 0½d. per lb.

Average London prices per lb. for tea consignments from other countries were as follows:—Ceylon 1s. 0.74d., Java 9.99d., Indian Northern 1s. 1.43d., Indian Southern 1s. 0.06d., Sumatra 9.64d. There was a further steady decline in prices during the month.

Tuba Root (Derris).—The Singapore average price of roots sold on rote-none content remained at \$40 per picul during September, but owing to the scarcity of supplies, only small quantities of the roots sold at this figure were up to the minimum standard of 3 per cent. required by the trade.

Little business was done in roots sold on a basis of ether extract as the high price demanded in recent months has created a deadlock, buyers abroad offering considerably less than the local market price. The average price for the month was \$30 per picul as compared with \$34.50 in August.

Prices paid to growers in Johore ranged from \$24 to \$30 per picul.

Coffee.—Singapore prices of coffee in September shewed little variation in comparison with those of August. Sourabaya coffee opened at \$19.50 to \$20.50 per picul and weakened slightly to close at \$19 to \$20. Palembang coffee opening at \$13.50 per picul, closed at \$13, an average of \$13.19 for the month as compared with \$13.32 in August.

Local prices for coffee beans ranged from \$13 to \$30 per picul.

Arecanuts.—September average prices in Singapore were as follows:—Splits \$4.81 to \$5.88, Sliced \$9.38 to \$10.38, Red Whole \$6.31 to \$6.81, Kelantan \$5.38 to \$5.63, the price in each range depending upon quality. No prices were quoted for Bila Whole and Sourabaya Whole.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best \$4.87, Medium \$4.58, Mixed \$4.02.

Gambier.—Singapore prices improved during September, closing at \$4.75 per picul for Block, and \$8.25 per picul for No. 1 Cube. The respective averages for the month were \$4.40 and \$7.70 as against \$4 and \$7.31 in August.

Pineapples.—The Singapore market is at a standstill; harvesting of the winter crop will commence shortly and the factories will re-open in October. Average prices per case quoted for the month were:—Cubes \$3.11, Sliced Flat \$3.04, Sliced Tall \$3.25 as compared with \$3.16, \$3.11, and \$3.28 respectively in August. Prices for fresh fruit ranged from 70 cents to \$4 per 100, according to quality. In Selangor, Sarawak pines ranged from \$4 to \$14 per 100.

Tapioca.—There were no fluctuations in the Singapore market during September with the exception of Pearl Seed which dropped 25 cents per picul at the close.

Average prices per picul were:—Flake Fair \$3.65, Seed Pearl \$5.70, Pearl Medium \$5.85, as compared with \$3.73, \$5.75 and \$6 respectively in August.

Sago.—This market also remained practically unchanged, Pearl, Small Fair easing 5 cents per picul at the close to average \$3.94 for the month and Flour, Sarawak Fair was quoted throughout at \$1.92½ per picul. The August average prices were:—\$3.95 and \$1.89 respectively.

Mace.—The commodity was in short supply during September and prices in Singapore rose considerably. Siouw averaged \$90 per picul and Amboina \$57 per picul as compared with \$80 and \$51 respectively in August.

Nutmegs.—The Singapore market continued without change at the August levels of \$24 per picul for 110's and \$25 per picul for 80's.

Pepper.—Prices advanced almost daily during September under buying pressure in London, but at the close of the month values in London tended to ease, stocks were high, and speculative buying appeared to have ceased. Average prices per picul in Singapore were:—Singapore Black \$15.50, Singapore White, \$40.30, Muntok White \$41.70 as compared with August respective averages of \$13.69, \$36.63 and \$37.69.

Cloves.—Singapore prices continued nominal at Zanzibar \$35 and Amboina \$45 per picul.

Tobacco.—Prices of sun-dried leaves ranged from \$10 to \$65 per picul. Java tobacco was quoted in Perak at \$32 to \$70 per picul and in Johore at \$40 to \$85 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY*

August, 1934.

Malaya.—Imports of foreign rice into Malaya during August were 54,515 tons and exports 15,191 tons, net imports accordingly being 39,324 tons. Net imports for the period January to August, 1934, were 302,241 tons, an increase of 7.5 per cent. over the corresponding period in 1934.

Of the imports during August, 47 per cent. were consigned to Singapore, 19 per cent. to Penang, 7 per cent. to Malacca, 17 per cent. to the Federated Malay States and 10 per cent. to the Unfederated Malay States. Of the total 68 per cent. came from Siam, 29 per cent. from Burma, 2 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during the month under review, 57 per cent. were shipped to the Netherlands Indies and 43 per cent. to other countries. The various kinds of rice exported were:—Siam 8,233 tons (54.2 per cent.), Burma 4,335 tons (28.5 per cent.), French Indo-China 444 tons (2.9 per cent.), India 2,017 tons (13.3 per cent.), local production 162 tons (1.1 per cent.).

India and Burma.—Foreign exports for the period January to June, 1934, totalled 912,000 tons, as compared with 1,175,000 tons for the corresponding period in 1933, a decrease of 22.4 per cent.

The total exports of rice and bran from Burma for the period 1st January to 28th July, 1934, amounted to 2,713,728 metric tons as compared with 2,305,155 metric tons for the corresponding period of 1933, an increase of 17.7 per cent.

It is reported (*Straits Times*, Singapore, 29th August, 1934) that there has been a sharp rise in the Rangoon rice market and that there is a shortage in the balance of rice available for export as present stocks should be exhausted by the middle of November. It is the general opinion that prices in 1935 will be very strong owing to droughts in Europe and in other parts of the world, famine conditions in Central China and floods in India and the Far East.

Siam.—Exports of rice from Bangkok in July were 151,475 tons, giving a total for the first seven months of the year of 1,006,804 tons as compared with 961,789 tons for the similar period in 1933.

Japan.—It is reported in the *Trans-Pacific Journal* 23rd August, 1934, that the 1934 rice crop may fall 5 per cent. below a normal year's crop and it is estimated at 8,320,000 tons, a decrease of 1,616,000 tons, or 16 per cent. as compared with the actual crop in 1933.

It is also reported that notwithstanding the weather's recovery and sales of 140,250 tons of Government rice to the market, rice prices shewed no signs of falling.

French Indo-China.—Entries of padi into Cholon, 1st January to 15th September, 1934, totalled 1,182,288 metric tons, an increase of 34 per cent. as compared with 882,654 metric tons during the corresponding period of 1933. Exports of rice for the same period this year were 1,087,969 metric tons as compared with 985,914 metric tons for the similar period of 1933, an increase of 10.4 per cent.

* Abridged from the Rice Summary for August, 1934, compiled by the Department of Statistics, S.S. and F.M.S.

According to a report on the Saigon Rice Market for August, 1934, prices rose during the month due to demands from China and India but closed on a fall with an undecided tendency.

Netherlands Indies.—Imports of rice for the period January to June, 1934, (*Economic Bulletin*, dated 1st September, 1934) amounted to 87,616 metric tons, a decrease of 62.5 per cent. as compared with imports of 234,118 metric tons during the corresponding period of 1933.

The area of wet and dry padi harvested during the same period this year amounted to 6,896,240 acres as compared with 6,864,130 in 1933, an increase of 0.5 per cent.

Ceylon.—Imports for the period January to August, 1934, totalled 321,472 tons, as compared with 298,886 tons for the same period of 1933, an increase of 7.6 per cent.

Of the 1934 imports, 14 per cent. were from British India, 63 per cent. from Burma and 23 per cent. from other countries.

Europe and America.—Shipments to Europe from the East were 877,297 tons for the period 1st January to 16th August 1934, as compared with 924,164 tons during the corresponding period in 1933, a decrease of 5.1 per cent.

Of the 1934 shipments 40 per cent. were from Burma, 6 per cent. from Japan, 43 per cent. from Saigon, 9 per cent. from Siam and 2 per cent. from Bengal. The corresponding percentages for 1933 were 51, 3, 39, 6 and 1 respectively.

Shipments to the Levant from the East during the period 1st January to 28th July, 1934, were 21,715 tons as compared with 20,457 tons for the same period in 1933, an increase of 6.1 per cent.

Shipments to the West Indies and America for the period 1st January to 12th July, 1934, were 110,231 tons, an increase of 12.3 per cent. as compared with 98,132 tons during the corresponding period of 1933.

MALAYAN AGRICULTURAL EXPORTS, AUGUST, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-Aug. 1933.	Jan.-Aug. 1934.	August 1933.	August 1934.
Arecanuts ...	20,756	13,513	21,967	1,592	2,373
Coconuts, fresh† ...	100,609†	68,066†	65,096†	8,530†	6,869†
Coconut oil ...	17,568	11,759	16,267	1,252	1,758
Copra ...	110,543	60,545	60,525	13,919	6,223
Gambier, all kinds ...	2,560	1,637	1,447	276	208
Oil cakes ...	9,992	6,838	7,310	307	202
Palm kernels ...	1,983	1,148	1,886	186	222
Palm oil ...	12,101	6,130	8,724	1,207	1,336
Pineapples canned ...	59,582	46,845	53,864	6,487	5,482
Rubber§ ...	459,836§	292,476	309,784§	41,074§	39,369§
Sago,—flour ...	7,648	2,850	4,746	467*	758
" —pearl ...	2,646	1,430	3,115	210	527
" —raw ...	4,420*	2,649*	4,121*	219*	577*
Tapioca,—flake ...	9,881	7,239	4,616	570	182
" —flour ...	702*	126*	1,316*	2	61*
" —pearl ...	17,297	11,608	10,728	2,097	1,346
Tuba root ...	569½	313½	381½	43	33

† hundreds in number.

* net imports.

§ production.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPTABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31st AUGUST, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (e)		AREA OF TAPTABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5) (9)	Percentage of (9) to (2) (10)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)		
STRAITS SETTLEMENTS:—									
(1)	(2)							(9)	(10)
Province Wellesley	44,285	1,127	2.5	8,508	19.2	633	1.4	9,635	21.7
Dindings	7,368	112	1.5	841	11.4	193	2.6	953	12.9
Malacca	121,152	584	0.5	16,527	13.6	3,130	2.6	17,111	14.1
Penang Island	1,366	184	13.5	398	29.1	201	14.7	582	42.6
Singapore Island	28,842	4,215	14.6	4,324	15.0	627	2.2	8,539	29.6
Total S.S.	203,013	6,222	3.0	30,598	15.1	4,784	2.4	36,820	18.1
FEDERATED MALAY STATES:—									
Perak	253,227	4,201	1.7	37,849	14.9	12,508	4.9	42,050	16.6
Selangor	310,003	3,621	1.2	43,801	14.1	11,255	3.6	47,422	15.3
Negri Sembilan	233,392	4,848	2.1	37,340	16.0	19,601	8.4	42,188	18.1
Pahang	46,712	4,367	9.3	15,457	33.1	9,609	20.6	19,824	42.4
Total F.M.S.	843,334	17,037	2.0	134,447	15.9	52,973	6.3	151,484	17.9
UNFEDERATED MALAY STATES:—									
Johore	365,400	11,081	3.0	23,609	6.5	22,090	6.0	34,690	9.5
Kedah (b)	126,588	2,051	3.2	26,277	20.8	23,318	18.4	30,338	24.0
Kelantan	25,793	2,061	8.0	2,180	8.4	5,418	21.0	4,241	16.4
Trengganu	4,543	Nil	Nil	171	3.8	171	3.8	171	3.8
Perlis (c)	1,181	Nil	Nil	266	22.5	Nil	Nil	266	22.5
Total U.M.S.	523,505	17,193	3.3	52,503	10.0	50,997	9.7	69,696	13.3
Total MALAYA	1,570,052	40,452	2.6	217,548	13.8	108,754	6.9	238,000	16.4

Notes:—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
 (b) Registered Companies only.
 (c) Rentered quarterly.
 (d) Figures are as reported by estate managers.

N.B.—The increase in the figures in columns 3, 5 and 7 for Pahang and in column 7 for Kedah as compared with previous returns is due to the inclusion of additional estates newly registered.

MALAYA RUBBER STATISTICS **TABLE I**
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTER,
FOR THE MONTH OF AUGUST, 1934 IN DRY TONS.

State or Territory	Stocks at beginning of month 1		Production by estates of less than 100 acres and over		Production by estates of less than 100 acres estimated 2		Imports		Exports including re-exports		Stocks at end of month	
	Ports	Dealers	Estates of 100 acres and over	during the month	January to August inclusive 1934	January to August inclusive 1934	Foreign	Local	Foreign	Local	Ports	Dealers
MALAY STATES :-	2	3	4	5	6	7	8	9	10	11	12	13
Federated Malay States	...	9,752	8,869	11,877	93,494	8,973	70,518	Nil	Nil	Nil	12,554	6,188
Johore	...	1,914	2,931	3,642	29,553	4,739	32,198	Nil	2	Nil	270	12,554
Kedah	...	349	1,970	2,684	21,870	1,331	11,938	Nil	Nil	Nil	270	12,554
Perlis	...	41	10	13	111	14	269	Nil	Nil	Nil	1,442	2,572
Kelantan	...	150	168	279	1,878	601	5,516	Nil	Nil	Nil	34	379
Trengganu	...	55	187	1,773	93	884	Nil	Nil	Nil	Nil	280	2,657
Total Malay States	...	12,261	13,948	18,682	146,796	15,751	124,315	Nil	2	319	270	15,740
SEMITENTS :-
Malacca	...	2,260	803	1,536	10,865	680	...	Nil	4	...	...	...
Province Wellesley	...	1,054	490	545	4,605	226	...	Nil	Nil	Nil	...	...
Dindings	...	26	138	112	867	103	18,851	Nil	Nil	Nil	...	...
Penang	...	2,854	14,476	13	14	100	84	Nil	13,846	19,625	...	...
Singapore	...	5,070	50,623	128	203	1,443	144	Nil	2,732	139,437	...	...
Total Straits Settlements	...	7,924	58,439	1,572	2,410	17,881	2,696	18,831	17,865	13,849	...	...
TOTAL MALAYA	...	7,924	80,700	14,920	21,092	166,580	18,277	143,194	17,865	13,851	159,385	133,480

TABLE II
DEALERS' STOCKS IN DRY TONS 3

Class of Rubber	Fed- rated States		Pro- We- is- day		Johore	
	Malay	Penang	Malacca	Dindings	Kedah	
20	21	22	23	24	25	26
DRY RUBBER	10,139	38,309	11,180	4,570	1,772	237
WET RUBBER	1,437	6,416	3,223	224	746	156
TOTAL	11,576	44,815	14,412	4,794	2,518	393

TABLE III
FOREIGN EXPORTS

PORTS	For month	
	January to August 1934	January to August 1934
Singapore	35,918	39,118
Penang	11,591	60,658
Port Swettenham	51,566	44,589
Malacca	576	4,784
MALAYA	52,641	45,550

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	
	January to August 1934	January to August 1934
Malay States	...	81,269
Straits Settlements	...	4,589
MALAYA	...	85,858

- Notes:— 1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula: Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption. i.e., Column [9] = Column [16] + [16] + [19] + [21] + [22] + [23] + [24] + [25] + [26] + [27] + [28] + [29] + [30] + [31] + [32] + [33] + [34] + [35] + [36] + [37] + [38] + [39] + [40] + [41] + [42] + [43] + [44] + [45] + [46] + [47] + [48] + [49] + [50] + [51] + [52] + [53] + [54] + [55] + [56] + [57] + [58] + [59] + [60] + [61] + [62] + [63] + [64] + [65] + [66] + [67] + [68] + [69] + [70] + [71] + [72] + [73] + [74] + [75] + [76] + [77] + [78] + [79] + [80] + [81] + [82] + [83] + [84] + [85] + [86] + [87] + [88] + [89] + [90] + [91] + [92] + [93] + [94] + [95] + [96] + [97] + [98] + [99] + [100].
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Domestic exports are reported by the Customs Authorities for the Malay States and by the Registrars of Imports and Exports for Province Wellesley, Malacca, Dindings and Labuan. For Singapore and Penang Island domestic exports are represented by sales or exports of rubber as shown by cess paid. Figures for Brunei and Sarawak are not included.
5. The above, with certain omissions, this Report published by the Registrar - General of Statistics, S.S. and F.M.S., at Singapore on 24 September, 1934.

METEOROLOGICAL SUMMARY, MALAYA, AUGUST, 1934.

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LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT					EARTH TEMPERATURE DEGREE		RAINFALL					BRIGHT SUNSHINE.							
	Means of		Mean of A and B.	Absolute Extremes			At 1 foot	At 4 feet	Total.	Most in a day.	Number of days.				Total.	Daily Mean.	Per cent.			
	A. Max.	B. Min.		Highest	Lowest	Min.					Max.	Min.								
				°F.	°F.	°F.					°F.	°F.	°F.	°F.						
		°F.	°F.	°F.	°F.	°F.	°F.	°F.	in.	mm.	in.	Precipitation, as in or more.	Thunder-storm.	Fog morning obs.	Gale force 8 or more.					
Railway Hill, Kuala Lumpur, Selangor	89.7	71.7	80.7	93	70	80	73	83.9	84.6	6.82	173.2	1.10	23	19	3	2	176.75	5.70	47	
Bukit Jeram, Selangor	87.6	72.5	80.0	93	70	80	74	82.8	84.6	10.16	258.1	3.02	15	15	4	1	2	199.90	6.45	53
Sitiawan, Perak	89.7	72.4	81.1	92	71	86	75	84.0	85.2	3.13	79.5	0.68	13	11	1			186.90	6.03	49
Temerloh, Pahang	89.4	72.3	80.9	92	70	85	75	84.5	85.9	4.57	116.1	0.96	16	15		9		188.45	6.08	50
Kuala Lipis, Pahang	88.2	70.9	79.5	91	67	84	74	83.2	84.5	8.55	217.2	1.26	20	18	4	23	4	175.75	5.67	46
Kuala Pahang, Pahang	86.9	73.5	80.2	91	71	84	77	85.6	86.1	5.20	132.1	1.17	13	13	6		2	235.00	7.58	62
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Bukit China, Malacca	84.2	73.5	78.9	87	71	79	76	82.9	83.9	6.27	159.3	2.41	14	10	2			169.95	5.48	45
Kluang, Johore	87.5	70.6	79.1	91	68	82	73	81.2	82.0	6.04	153.4	1.96	17	16	1	1		158.55	5.11	42
Bukit Lalang, Mersing, Johore	87.0	71.6	79.3	90	69	82	74	80.9	81.6	9.23	234.4	1.63	21	18	4	3		206.00	6.65	55
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Kota Bahru, Kelantan	89.4	73.3	81.3	92	71	87	76	84.3	84.9	9.22	234.2	1.86	17	13	8			209.55	6.76	55
Kuala Trengganu, Trengganu HILL STATIONS.	87.7	72.3	80.0	90	70	81	75	82.8	84.4	6.14	156.0	1.45	16	13	2			196.65	6.34	51
Fraser's Hill, Pahang 4268 ft.	74.0	62.3	68.1	78	60	68	64	71.3	72.1	6.15	156.2	1.17	18	18	4	5	1	162.45	5.24	43
Pahang Cameron Highlands, Tanah Rata, Pahang 4750 ft.	71.5	57.0	64.3	74	51	67	61	70.2	69.7	7.34	186.5	1.17	29	25		2		141.20	4.55	37
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	70.6	59.1	64.9	74	57	64	61			7.83	198.9	1.27	29	24		2		146.30	4.72	38

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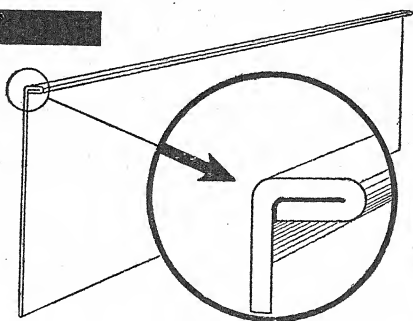
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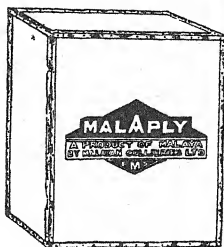
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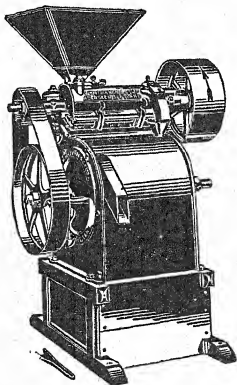
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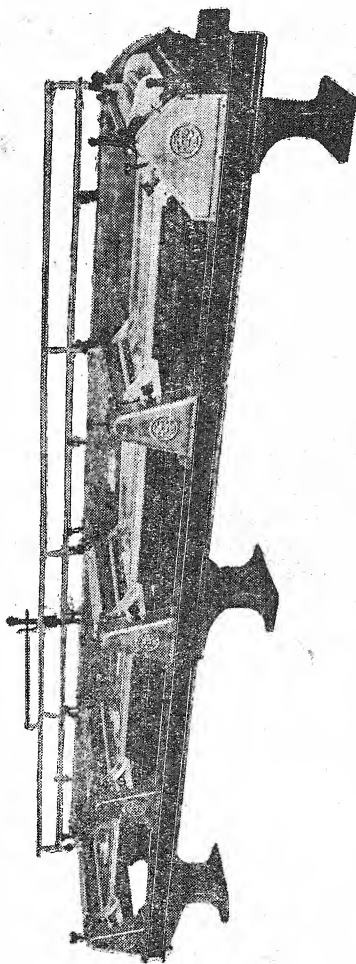
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MALAYAN AGRICULTURAL STATISTICS 1933.

by

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Malaya, with palms between 10 and 21 years of age, neither manuring nor liming of coconut areas will prove economical. The most satisfactory system would appear to be to supply the area with a cover which is periodically cut and to concentrate attention on adequate drainage.

In addition, investigation has been made into systems of cultivation; the comparative effects of cover slashed periodically, cover buried twice a year, and clean weeding with and without cultivation. The effect of these systems on the different estates on which the experiments were conducted is detailed and will repay study.

Experiments on cultivation and manuring coconuts must be interpreted from two points of view. In the first place, consideration must be given to a determination of the degree of significance of the results; and secondly, the practical man expects that experimental work on crop production shall not be entirely alienated from its practical aspect. Increased crop production may normally be anticipated as a result of judicious manuring and cultivation. As the yield thus increases, the cost of production of each extra unit of increase also rises, until a point is reached at which no further economic increase of production is possible.

It follows, therefore, that in times when the product demands a high market price, it pays to produce the higher units of production, whereas in times of low prices, lower production must prove more remunerative.

The conclusions regarding treatment of the land for coconut production have been reached with due regard to the financial aspect of the problems. The curtailment of expenditure with the least diminution of crop must be the basis of consideration at the present time, and it is in this light that these results of investigations of the Department of Agriculture are interpreted.

The Oil Palm Inflorescence.

The article in this number on the floral morphology of the oil palm places on record the facts in a complete form which we believe has not hitherto been attempted elsewhere. The planter of oil palms may possibly glance at the article and conclude that the writer in entering into the realms of botany thus alienates himself from estate interests. Closer consideration, however, may convince him that an appreciation of floral morphology of the oil palm is of very great practical value on the estate. The flower results in the fruit and one of the subjects upon which we venture to predict we have not yet heard the last word is the extent to which artificial pollination of oil palms is justified. The present article forms an introduction to this subject of pollination to which the author will return in a subsequent number.

Agriculture in Johore.

The Report on Agricultural Development in Johore, by Dr. H. A. Tempany, C.B.E., covers, without the Appendices, twenty-seven pages. The preparation of an abstract of this document proved somewhat difficult. The report is an authoritative statement of the present condition and great value of agriculture in that State, and indicates the future possibilities of development. The abstractor is faced with the alternative of exceeding the available space for the abstract, or of doing injustice to the author by reason of the omission of subject matter which is used cumulatively to support the writer's conclusions.

The main argument of the report is to shew the rapid growth of agriculture in Johore and the fact that at present a point has been reached at which production has attained its greatest height under the existing systems of cultivation. Further progress depends on greater systematization, the adoption of methods whereby husbandry may replace mere crop production. The plea, therefore, is for a close regard of the results of investigations already carried out by the Department of Agriculture, Straits Settlements and Federated Malay States; for the inauguration of further experimental work on the particular problems which have become evident; and for the shouldering by the Johore Government of its share of the cost of the services of this organisation in view of the fact that the research work of the Department is of direct value to that State.

Original Articles.

EXPERIMENTS ON THE CULTIVATION AND MANURING OF COCONUTS IN MALAYA

(Summary of Results obtained between 1930 and 1934)

BY

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In previous issues of this Journal (1) an account has been given of cultivation and manurial experiments on coconuts, with results to the end of 1932. The lay-out has been fully described and consists of sixteen 16-tree plots used to test four surface treatments: (a) cover slashed every three months, (b) cover buried to a depth of seven inches twice a year, (c) clean weeding with cultivation to a depth of seven inches twice a year, and (d) clean weeding without cultivation. Each plot is divided into four 4-tree sub-plots with the following treatments: (i) a complete manurial mixture of whale guano compound $2\frac{1}{2}$ lbs., steamed bone meal 6 lbs. and muriate of potash $1\frac{1}{2}$ lb. per tree (designated for convenience NPK), (ii) the complete mixture as in (i) with lime at the rate of 10 piculs (approx. 12 cwt.) per acre (LNPK), (iii) lime alone at the same rate (L), (iv) control.

Nitrogen was supplied in organic form as it was thought possible that owing to slow decomposition it might be made available for a longer period than would be the case if inorganic fertilizers, such as ammonium sulphate or calcium cyanamide, were employed. Subsequent work (2) on the nitrification of castor cake has rendered this doubtful. A complete mixture was used as it was desired to ensure that none of the three essential elements most likely to be deficient would be lacking. Repeated deep cultivation, whether of clean-weeded areas or in the process of burying the cover crop, although known to be impracticable as a commercial proposition, was given to ensure that its absence should not act as a limiting factor in these experiments.

At the inception of the experiments, variation among palms was known to be great (3) so that it was not expected that significance in any one year would be attained for differences of less than say 25 per cent. of the mean. In view of the price ruling for copra (\$5 per picul), then thought to be low, this was immaterial, since smaller differences would not repay cost of treatment. As explained in previous articles, it was desired to spread the experiments over as wide a variety of soils as possible and with the means available it would have been a physical impossibility to deal with greater numbers of palms.

Since the time from flowering to maturity of nuts is approximately eleven months, it may be assumed with some confidence that yield will be unaffected by treatments or manures during the first year of the experiment and that these results may be used as additional controls for those of subsequent years. This is confirmed by another experiment on liming of a very acid soil, results of which will be published later.

Table I gives general particulars; Table II, analyses of the soils under experiment; Table III, the mean water level in drains and dates of application of manures. Table IV gives results of nut counts for the full period of the experiment.

In Table IV means for the four surface and four manurial treatments are given. It is possible, in addition, to derive sixteen means for the combinations of surface and manurial treatments; *e.g.* cover slashed — NPK — LNPK — L. and — control; cover buried — NPK — LNPK — L. and — control; analysis of the 1933 results shows interaction to have been absent between surface treatments and manures, and to avoid complication of Table IV these sixteen means have been omitted. The opportunity has been taken to correct a number of slips and one serious error in tables previously published.

All statistical working has been carried out by expressing yields as a percentage of the annual general mean in each case, as this facilitates comparison from year to year.

A word on "significance" may be useful. No experiment and no system of statistical analysis can give certainty to a result; all that such analysis can do is to provide an estimate of the reliability to be attached to results. In agricultural experiments when the odds are 20 to 1 against differences obtained being due to chance, such results are said to be "significant" and worthy of consideration. Whether, even if significant differences are obtained, treatments can be recommended is, of course, a matter of economics.

In analysis two tests are available, one known as the "Z" test, indicating whether or not significance exists anywhere in the results obtained and the other the "t" test, which may be extended to calculate the minimum difference required for significance between any pair of treatments and hence to find the location of the significance indicated by "Z".

In all cases for 1933 and 1931 the minimum differences for significance have been calculated, even where such differences were obviously not attained, in order to arrive at an estimate of the order of differences capable of detection in these experiments.

In border-line cases it sometimes happens that the "t" test will indicate significance where the "Z" test does not; in theory the positive evidence may be accepted, but the writers prefer to regard such cases as "not proven".

Results in the rows $y-bx$ are obtained by the method of covariance of Sanders (4), by which an estimate may be made of the part played by the permanent factors—inherent character of the palms and soil variation. The

figures in these rows do not represent hypothetical mean yields, but only that portion of the actual yield which cannot under the conditions of the experiment be assigned to permanent factors; differences shown between mean yields are therefore more likely to be due to treatment than are those in the 1932 to 1933 rows where inherent yield capacity may play a part. In an endeavour to indicate the theoretical nature of figures in this row, mean numbers of nuts have been given in whole numbers only.

It will be observed that analysis of the January—June 1934 results has not been undertaken. They reveal no new differences and the experimental error may be taken as of the same order as that of the whole of 1933, except in the case of Estate B where numbers are so small that the error is probably very great.

Size of Nuts.

Before discussing results in Table IV in detail the question of nut size must be considered.

In addition to influencing numbers of nuts produced or brought to maturity, treatments may affect the size and consequently weight of nuts or the water content of the meat.

Under the conditions of these experiments conversion of separate parcels of nuts into copra was an impossibility and an indirect method was essential. As mentioned in last year's summary, Mr. F. C. Cooke (Officer-in-Charge, Copra Investigations) showed that there was a close relationship between weight of husked nut and meat. This has subsequently been confirmed in Ceylon. Water content of meat varies within such narrow limits that this source of variation may be excluded and the assumption made that any change of resultant copra will be indicated by change in weight of husked nuts. Unfortunately, this relationship was not proved until the latter part of 1932 so that a back check cannot be applied. During 1933 the total weight of husked nuts as well as numbers from each sub-plot were recorded on three occasions, *vis.* in February, June and October, and Table V gives mean numbers and weights. It will be seen that there are no variations of any order likely to be significant.

In order to test the reliability of three observations, the relationship of numbers recorded for three collections to those for the whole year was ascertained and found, as Table VII shows, to be close.

The weight of the mean nut for each treatment may be ascertained from the data in two ways which will not necessarily give concordant results. For the first, total (or mean) weights for each treatment may be divided by the total (or mean) numbers; for the second, the separate sub-plot totals (or means) may be employed and one "ideal" not supposed to be harvested from each sub-plot. The former method gives a mean correctly weighted for numbers of nuts and is the one of practical value, the latter gives results susceptible of statistical analysis. As Table VI shows, there are rarely serious differences between the figures obtained by the two methods. Both from the common-sense and

statistical view-points, the table shows that with one exception, large variations ascribable to treatments are absent; only in the case of Estate F does variation attain significance by both tests and then amounts to 8 per cent. only as the result of liming. This confirms the impression derived from visual comparison of numbers and weights in columns I and II, and very strongly indicates that for these experiments the only changes which need be considered are those of numbers of nuts.

Discussion of Results.

Reverting to Table IV and comparing differences in the $y-bx$ rows between pairs of manurial treatments with the minimum significant differences, it is seen that, with the exception of Estate B, neither manuring nor liming nor the combination was anywhere definitely significant. Estate B is exceptional and will be discussed separately. Estate F is a border-line case; the "Z" test shows no significance, but by the "t" test liming is just better than the control: doubt is cast on this, however, by the fact that the increase of yield from lime and manure does not attain significance.

Surface Treatments.

There are no significant differences on Estates A and G. On Estate B the two bare surface treatments, cultivation and clean-weeding, are definitely better than two treatments involving growth of a cover.

On Estate C the two bare surface treatments are just better than cover slashed but not than cover buried; the fact that such differences as occur are significant is due to the remarkably small experimental error shown on this Estate. On Estate D cultivation is just possibly better than cover buried.

Estate E. The two bare surface treatments are definitely better than cover buried and suggestively close to significance over slashed.

Estate F. Cultivation is definitely better than cover buried and just better than cover slashed; it just misses significance over bare surface without cultivation. The soil on this Estate is exceptionally heavy and these results, together with those of the effect of liming on the size of nuts, are not unexpected.

Excluding Estate B, such significant increases as have occurred are of the order of 10 per cent. of the mean, or roughly of 1 picul of copra per annum, worth say \$3. Putting manufacture, collection and transport at 80 cents per picul there remains \$2.20 per acre per annum. For a return such as this, cultivation is obviously out of the question, and clean weeding would cost not less than \$6 per acre under the most favourable condition. It follows, therefore, that for estates on what may be called "normal" Malayan soils with palms of ages ranging from 10 to 21 years, neither manuring with any reasonable quality of manure, liming, nor any form of soil treatment studied, nor any combination of the two is likely to give economic returns. This conclusion is supported by large-scale manuring and liming trials (not capable of statistical analysis) carried out on Estate A several years ago and by experiments of several

years duration on an estate not in this list carried out by Dr. H. W. Jack (late Economic Botanist of this Department). The latter experiments were spoilt for analysis by unexpected variation in time of the plots, most likely due to sub-soil variations, but would have shown indications of large differences if such had existed.

The cover in these experiments was slashed; uncontrolled growth may possibly have resulted in greater differences.

This absence of response must be due to one or more limiting factors other than those under observation. Factors which suggest themselves are inherent yielding capacity of the unselected Malayan palm population, soil aeration, and chemical composition and water supply. Although the soils of Estates A, C—G vary among themselves, they are all heavy compared with many Ceylon coconut soils and the very sandy soils or almost pure sands of many tropical islands where coconuts are grown. Reasonable growth on "normal" Malayan coconut soils is, in fact, dependent on intensive drainage.

This heavy texture might possibly prevent sufficient aeration of the roots to permit of response to manures, and it was for this reason that cultivation was included; only on the heaviest soil of all has any marked response to cultivation been obtained, but even in this case there was no special response of the cultivated plots to manurts. It must, therefore, be concluded that, given adequate drainage, lack of soil aeration is not the obstacle which inhibits largely increased crops as the result of manuring.

Convincing proof that insufficient soil moisture is not the cause of soil lack of response in these experiments is furnished by Estate "D" which is provided with an efficient system of sub-soil irrigation. Here manures should have had free play, but have effected nothing.

Incidentally, it is puzzling to find that on this estate nut size is the smallest recorded. The writers can only suggest that the palms are, as a whole, very near the upper limit of their yield capacity under the whole congeries of soil and meteorological conditions on any given "normal" estate and cannot be materially influenced by any economic or near economic treatment.

On Estate B the situation is totally different. The trees are very old, the soil is light and poor and the property is understood to have been somewhat neglected in the past.

Yields have obviously been largely increased by keeping the surface bare and also by the application of lime and fertilizer. Examination of the sixteen sub-means set out in Table VI suggests that there may have been differential response to manures superimposed on different surface treatments and apparent confirmation is given to this by analysis of the 1933 results alone. However, when the considerable initial variation shown in 1931 is allowed for by application of covariance, this is seen to be illusory. The fact that there is no *differential*

response does not mean that a better response is not obtained when two good treatments meet and this is indeed found to be the case, highest yields being obtained by combination of lime, fertilizer and bare surface.

From the financial standpoint it will be noted that clean weeding without manurial application gave a corrected increase of 22 nuts per palm over the corresponding cover-slashed plot, whereas the addition of lime and fertilizer gave an additional 20 nuts.

Twenty nuts per palm at 50 palms per acre and 250 nuts per picul of copra may be taken as approximately equivalent to 4 piculs—valued at \$2.20 (vide page 514) per picul which gives a return of \$8.80 per acre per annum in return for an expenditure of \$5 or \$6 for clean weeding and a similar return for a lime manurial mixture costing say \$15 per acre. The former would be remunerative, the latter would not. There is some evidence, however, from another source that one application of lime may have effects lasting three or more years; if this should prove to be the case, the application would be considerably reduced in cost. The manurial mixture actually used in these experiments is relatively expensive and from what is now known could almost certainly be replaced by cheaper artificial, *e.g.* ammonium sulphate or calcium cyanamide and rock phosphate or basic slag. If cyanamide and slag were used it might be possible to dispense with additional lime and to reduce the cost of annual application to \$5 or \$6.

Even this one apparently financially satisfactory result is open to doubt. 1933 was a peak year everywhere; increases in 1932 were smaller and the figures for the first half of 1934 are disconcerting, the more so as the relative position of the different treatments is approximately maintained, which excludes the obvious possibility that the drop in mean yield is due to exhaustion of manures or lime. (None was applied in 1933 or 1934).

Here then the commercial feasibility of treatment in the broad sense cannot be regarded as definitely proved and judgement must be reserved until figures for the whole of 1934 are available.

The Future of the Experiments.

Records have been discontinued since the end of June 1934 on all Estates except B as it seems clear that little useful purpose will be served by continuing the experiments in their present form. The results obtained should be of value although negative, as showing directions in which waste of money can be avoided.

It is proposed to investigate the possibility of growing less dense covers than *Centrosema* on heavy soils under mature coconuts, in the hope that they may combine the advantages of clean-weeding with the cheapness of a cover. If these attempts are successful the experiments will be reorganised to test their effect on yield. Recording on Estate B continues and it is intended to make a fresh manurial application next year, using the cheapest possible mixture.

Summary.

An account is given of experiments in progress since 1931 on seven coconut estates.

It is shown that on 'normal' soils neither manuring, liming nor clean weeding is likely to increase yields from mature coconuts to an economic degree over those obtained from unmanured plots with cover kept under control.

On one of the Estates on poor light soil, large responses to clean-weeding and to application of manures and lime were obtained, but owing to a heavy drop in yield in the first part of 1934 definite conclusions cannot yet be drawn.

It is desired again to emphasize that the conclusion in paragraph two applies to normal areas of palms from 10 to 20 years old not over-drained.

There is some evidence that a cover may considerably retard young coconuts or older palms on over-drained soil. On an area of exceedingly acid soil (pH 2.0 to 3.5) liming has been shown to be of benefit. Such areas are fortunately not of frequent occurrence.

The writers wish to express their thanks to the managers of the estates on which these experiments were carried out for continued help freely given, and to Che Shaffie bin Mohamed Taib, Che Abdul Malik bin Abdul Pakih and Che Abdul Chaffar bin Sidek for their care in the labourious task of recording.

Appendix.

For the benefit of the statistically minded Table VII, giving standard deviations etc., is appended. It should be explained that one of us only (W.N.C.B.) must bear the blame for errors of computation which may have occurred in the tables and analyses.

It will be noted that instead of "Z"—a "Z ratio" is given; this is the ratio of the appropriate variances and is that number of which half the natural logarithm is Z. The writer personally has found it easier once and for all to construct a table of numbers corresponding to Fisher's table of "Z" and use these. The necessity at the end of a long calculation to have recourse to log tables is, again personally, peculiarly irritating.

References.

1. Experiments on the Manuring of Coconuts and Oil Palm. Compiled from Department Records. *Malayan Agricultural Journal* Vol. 20, page 105, 1932.
Manuring Experiments with Coconuts and Oil Palm—W. N. C. Belgrave and J. Lambourne. *Malayan Agricultural Journal* Vol. 21, page 543, 1933.
2. Studies in Malayan Soils III—R. G. H. Wilshaw, *Malayan Agricultural Journal* Vol. 22, page 4, 1934.
3. Variation in Coconuts—H. W. Jack. *Malayan Agricultural Journal* Vol. 15, page 387, 1927.
4. A Note on the Value of Uniformity Trials for Subsequent Experiments. H. C. Sanders. *Journal of Agricultural Science* Vol. 20, page 63, 1930.

Table I.

Estate.	Locality.	Age of palms at commencement of experiment.	Type of soil.	Treatment before experiment started.	Type of cover employed in experiment.
A	Banting	21 years	Alluvial clay loam	Clean weeded	Grass and weeds
B	Province Wellesley-North	Unknown, very old	Sandy soil over white silt	Under grass	Grass
C	Province Wellesley-South	20 years	Heavy clay	Under <i>Centrosema pubescens</i> and grass ploughed in at intervals	<i>Centrosema</i> and grass
D	Krian District	20 years	Friable clay loam	Clean weeded	<i>Centrosema</i> and <i>Mikania scandens</i>
E	Bagan Datoh	20 years	Heavy clay	Grass, <i>Centrosema</i> and fern	Grass, <i>Centrosema</i> and fern
F	Sabak Bernam	17 years	Very heavy clay	Leguminous covers and weeds. Block 4 <i>Centrosema</i> and grass	Grass and leguminous covers Blocks 1-3 <i>Centrosema</i> in Block 4
G	Sepang	10-11 years	Peat overlying heavy clay	3 blocks under weeds and fern. 1 Block <i>Mikania scandens</i>	3 blocks under weeds and fern. 1 block under <i>Mikania scandens</i>

Table II.
Soil Analysis

Physical

Chemical

		Gravel	Coarse sand	Fine sand	Silt	Clay	Loss on Ignition	pH			Oven dried per cent.		Ignited per cent.		
								Suspension	Filtrate	Carbon	Nitrogen	CaO	Sequi Oxides	K ₂ O	P ₂ O ₅
Estate A	Top Soil	Nil	Nil	Per Cent. 27	30	41	11	4.3	6.0	3.56	0.220	0.088	13.40	0.718	0.044
	Sub "	"	"	21	27	53	9	3.9	4.8	2.55	0.150	0.043	15.22	0.742	0.032
Estate B	Top Soil	6	31	23	18	18	4	4.5	6.6	1.31	0.105	0.045	11.22	0.201	0.024
	Sub "	6	33	18	19	21	5	5.0	7.0	1.14	0.080	0.038	10.79	0.209	0.021
Estate C	Top Soil	2	7	20	30	43	6	4.8	6.8	2.47	0.171	0.085	13.89	0.638	0.158
	Sub "	2	8	27	24	39	8	5.0	7.0	2.36	0.143	0.121	12.47	0.549	0.087
Estate D	Top Soil	Nil	Nil	24	34	37	12	4.3	6.2	4.25	0.224	0.136	14.73	0.681	0.087
	Sub "	"	"	17	41	43	11	3.8	6.0	4.02	0.213	0.196	13.85	0.598	0.229
Estate E	Top Soil	Nil	Nil	2	29	70	13	4.0	6.8	2.43	0.238	0.196	24.23	0.921	0.075
	Sub "	"	"	3	29	69	12	4.6	6.6	3.05	0.210	0.070	23.35	1.101	0.075
Estate F	Top Soil	Nil	Nil	2	31	68	11	4.4	7.0	1.74	0.164	0.091	21.14	0.628	0.049
	Sub "	"	"	1	32	68	9	4.4	6.8	1.11	0.098	0.039	21.41	0.683	0.031
Estate G	Top Soil	Nil	not determined.				26	4.0	5.0	10.99	0.388	0.165	8.73	0.518	0.064
	Sub "	Nil	Nil	32	32	37	17	3.7	5.6	6.72	0.259	0.072	13.85	0.713	0.057

Table I.

Estate.	Locality.	Age of palms at commencement of experiment.	Type of soil.	Treatment before experiment started.	Type of cover employed in experiment.
A	Banting	21 years	Alluvial clay loam	Clean weeded	Grass and weeds
B	Province Wellesley-North	Unknown, very old	Sandy soil over white silt	Under grass	Grass
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Table II.
Soil Analysis

Physical						Chemical									
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								Suspension	Filtrate	Carbon	Nitrogen	CaO	Sequest. Oxides	K ₂ O	P ₂ O ₅
Estate A	Top Soil Sub "	Nil	Nil	Per Cent. 27 21	30 27	41 53	11 9	4.3 3.9	6.0 4.8	3.56 2.55	0.220 0.150	0.088 0.043	13.40 15.22	0.718 0.742	0.044 0.032
Estate B	Top Soil Sub "	6	31 33	23 18	18 19	18 21	4 5	4.5 5.0	6.6 7.0	1.31 1.14	0.105 0.080	0.045 0.038	11.22 10.79	0.201 0.209	0.024 0.021
Estate C	Top Soil Sub "	2	7 8	20 27	30 24	43 39	6 8	4.8 5.0	6.8 7.0	2.47 2.36	0.171 0.143	0.085 0.121	13.89 12.47	0.638 0.549	0.158 0.087
Estate D	Top Soil Sub "	Nil	Nil	24 17	34 41	37 43	12 11	4.3 3.8	6.2 6.0	4.25 4.02	0.224 0.213	0.136 0.196	14.73 13.85	0.681 0.598	0.087 0.229
Estate E	Top Soil Sub "	Nil	Nil	2 3	29 29	70 69	13 12	4.0 4.6	6.8 6.6	2.43 3.05	0.238 0.210	0.196 0.070	24.23 23.35	0.921 1.101	0.075 0.075
Estate F	Top Soil Sub "	Nil	Nil	2 1	31 32	68 68	11 9	4.4 4.4	7.0 6.8	1.74 1.11	0.164 0.098	0.091 0.039	21.14 21.41	0.628 0.683	0.049 0.031
Estate G	Top Soil Sub "	Nil	not determined Nil	32	32	37	26 17	4.0 3.7	5.0 5.6	10.99 6.72	0.388 0.259	0.165 0.072	8.73 13.85	0.518 0.713	0.064 0.057

Table III.

Estate.	Mean water level in drains.	Dates of Application of Manures.			
		1st application.		2nd application.	
A	2½-3 ft.	11.7.30	31.7.30	— 7.31	— 8.31
B	2-3 ft.	5.1.31	9.2.31	18.1.32	22.2.32
C	2½-3¼ ft.	4.3.31	24.3.31	23.2.32	19.2.32
D	2-2½ ft.	6.1.31	20.2.31	5.1.32	24.2.32
E	2 ft.	8.1.31	12.2.31	8.2.32	26.2.32
F	2-4 or 5 ft.	9.1.31	13.2.31	9.2.32	27.2.32
G	4-5 ft.	26.1.31	23.2.31	31.1.32	9.3.32
				9.8.32	30.8.32

Table IV.
Results of Nut Counts,
Estate A.

	Cover slashed	Cover buried	Clean & weeded & cultivated	Clean weeded only	Minimum difference for significance between any pair of treatments	N P K	L N P K	Control	Minimum difference for significance between any pair of treatments	Minimum increase for significance over control	General Mean Nuts per Palm
1931											
Percentage of General Mean	98.0	106.6	99.4	95.4	23.6	99.3	103.2	103.4	17.9	10.8	
Nuts per Palm	54.1	58.1	54.7	52.8		55.0	56.9	57.1			55.2
1932											
Percentage of General Mean	95.5	99.3	102.1	103.2		92.0	104.0	101.7			
Nuts per Palm	45.2	48.3	48.8	47.0		43.5	49.2	48.3			47.4
1933											
Percentage of General Mean	100.6	102.3	96.6	100.6	26.6 "Z" not significant	98.0	111.1	97.0	14.3	8.5 "Z" not significant	
Nuts per Palm	64.7	65.7	62.1	64.6		63.0	71.4	62.3			64.3
First half 1934											
Percentage of General Mean	101.7	96.5	108.8	92.9		89.3	108.4	98.6			
Nuts per Palm	23.7	22.5	25.1	21.7		20.8	25.3	23.0			23.3
y-r 1933/34											
Percentage of 1933 Mean	42.6	38.1	34.3	40.8	20.5 "Z" not significant	57.0	69.5	54.1	16.6	12.1 "Z" not significant	
Nuts per Palm	28	26	22	27		37	45	35			

Estate B.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance between any pair of treatments	N P K	L N P K	Time	Control	Minimum difference for significance between any pair of treatments	Minimum increase for significance over control	General Mean Nuts per Palm
1931												
Percentage of General Mean	87.2	118.2	97.7	96.9	71.0	86.6	98.1	87.7	127.6	55.0		13.0
Nuts per Palm	11.3	15.3	12.7	12.6		11.3	12.8	11.4	16.7			
1932												
Percentage of General Mean	86.5	87.1	132.8	93.7	31.4	96.7	111.3	91.4	100.5		22.8	23.4
Nuts per Palm	20.2	21.1	31.0	20.3		22.6	25.9	21.3	23.5			
1933												
Percentage of General Mean	55.0	80.0	135.8	129.4	39.0	88.7	120.1	98.8	92.5	20.6	16.8	38.0
Nuts per Palm	20.9	30.4	51.6	49.2	"Z" not significant	33.7	45.7	37.5	35.2	"Z" just significant		
First half 1934												
Percentage of General Mean	72.1	78.5	130.1	118.7		97.3	116.9	93.4	92.0			6.8
Nuts per Palm	4.9	5.4	8.9	8.1		6.7	8.0	6.4	6.3			
3-yr 1933/34												
Percentage of General Mean	11.4	20.9	96.9	81.0	18.4	69.6	98.4	79.4	64.4	16.9	13.7	
Nuts per Palm	4	8	37	31	"Z" significant							

Estate C.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance between any pair of treatments	N P K	L N P K	Time	Control	Minimum difference for significance between any pair of treatments	Minimum increase for significance over control	General Mean Nuts per Palm
1931												
Percentage of General Mean	101.1	96.8	102.7	98.9	6.8	101.1	94.8	103.2	100.5	8.3	6.8	
Nuts per Palm	88.9	85.0	90.3	86.7	"Z" not significant	88.9	83.1	90.2	88.1	"Z" not significant		87.6
1932												
Percentage of General Mean	92.3	98.0	103.5	106.2		104.2	92.4	101.4	102.0			
Nuts per Palm	81.9	87.0	92.1	94.0		92.6	81.8	90.0	90.5			88.7
1933												
Percentage of General Mean	95.7	95.7	105.0	103.6	7.9	101.3	93.0	107.8	97.9	11.6	9.5	
Nuts per Palm	96.2	96.2	105.7	104.3	"Z" not significant	102.0	93.6	108.5	98.6	"Z" not significant		100.6
First half 1934												
Percentage of General Mean	99.7	92.9	106.8	100.4		106.2	94.5	99.1	100.1			
Nuts per Palm	41.1	38.3	44.5	41.4		43.8	39.0	40.9	41.3			41.2
y-br 1933/31												
Percentage of 1933 Mean	44.2	48.3	52.7	52.3	6.8	9.3	6.6	13.7	6.4	8.4	6.9	
Nuts per Palm	44	48	53	52	"Z" not significant	10	7	14	7	"Z" not significant		

Estate D.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance between any pair of treatments	N P K	L N P K	Lime	Control	Minimum difference for significance between any pair of treatments	Minimum increase for significance over control	General Mean Nuts per Palm
1931												
Percentage of General Mean	91.4	107.0	102.5	99.1	16.0 "Z" not significant	94.7	101.7	98.1	105.4	15.0	12.1	68.1
Nuts per Palm	63.2	73.0	70.0	67.7		64.5	69.9	67.9	71.9			
1932												
Percentage of General Mean	84.9	101.1	113.5	100.5	16.9 "Z" not significant	89.6	99.3	104.0	107.0	18.5 "Z" not significant	15.0	65.2
Nuts per Palm	55.2	65.9	74.9	65.5		58.2	64.5	67.6	69.8			
1933												
Percentage of General Mean	94.0	95.0	110.5	100.2	20.4 "Z" not significant	100.2	105.0	94.3	100.4	12.5 "Z" not significant	10.2	70.9
Nuts per Palm	75.1	76.1	88.6	80.2		80.2	84.0	75.3	80.6			
First Half 1934												
Percentage of General Mean	91.8	92.3	109.6	106.2		92.2	103.1	104.1	101.5			33.9
Nuts per Palm	31.1	31.3	37.6	36.0		31.2	34.9	35.4	34.3			
3-yr 1933 Mean	35.8	21.5	44.8	37.1	18.8 "Z" not significant	51.1	82.1	43.6	45.5	9.5 "Z" not significant	7.8	
Nuts per Palm	28	17	35	30		41	41	35	36			

Estate F.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance between any pair of treatments	N P K	L N P K	Lime	Control	Minimum difference for significance between any pair of treatments	Minimum increase for significance over control	General Mean Nuts per Palm
1931												
Percentage of General Mean	103.6	98.9	105.2	92.8	30.8	100.7	91.0	103.1	104.8	20.1	15.9	
Nuts per Palm	49.9	47.7	50.6	44.5	"Z" not significant	48.5	43.9	49.6	50.6	"Z" not significant		48.1
1932												
Percentage of General Mean	98.3	89.9	117.0	94.9		101.8	98.2	106.0	93.7			
Nuts per Palm	45.3	41.4	53.9	43.7		46.9	45.2	49.0	43.2			46.1
1933												
Percentage of General Mean	98.9	86.4	119.6	95.1	26.4	98.4	97.3	110.8	93.5	19.3	15.4	
Nuts per Palm	49.9	43.6	60.3	48.0	"Z" not significant	49.7	49.1	55.9	47.9	"Z" not significant		50.5
First half 1934												
Percentage of General Mean	100.0	87.6	112.9	99.4		101.2	96.5	106.0	96.3			
Nuts per Palm	22.0	19.6	25.3	22.3		22.7	21.6	23.8	21.6			22.7
y-b-r 1933/31												
Percentage of General Mean	38.9	29.0	58.6	41.6	17.7	37.9	42.6	48.8	30.8	14.6	11.8	
Nuts per Palm	29	15	30	21	"Z" significant	19	22	25	16	"Z" not significant		

Estate G.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance between any pair of treatments	N P K	L N P K	Lime	Control	Minimum difference for significance between any pair of treatments	Minimum increase for significance over control	General Mean Nuts per Palm
1931	Percentage of General Mean	102.3	102.4	98.4	96.9							
	Nuts per Palm	47.3	47.4	45.5	44.8	101.9	96.8	103.2	98.1	24.4 "Z" not significant	198	46.1
1932	Percentage of General Mean	97.0	99.7	93.6	108.8							
	Nuts per Palm	53.6	55.1	51.7	60.7	96.5	101.6	100.6	101.8			55.3
1933	Percentage of General Mean	96.3	100.0	100.7	102.2							
	Nuts per Palm	50.9	53.2	53.2	54.8	98.3	100.8	100.1	100.7	19.8 "Z" not significant	162	52.8
First half 1934	Percentage of General Mean	91.1	101.4	96.4	101.1							
	Nuts per Palm	73.5	15.1	14.3	16.7	93.7	105.7	95.2	105.3			71.9
y-bx 1933/31	Percentage of General Mean	26.9	31.1	33.9	36.6							
	Nuts per Palm	14	16	18	19	49.0	54.3	50.1	53.0	15.7 "Z" not significant	128	

Table V.
Results of Three Harvests during 1933.
Estate A.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance	N P K	L N P K	Time	Control	Minimum difference for significance	General Mean
No. of nuts											
Percentage of General Mean	98.7	104.1	103.0	94.0		91.8	104.1	97.8	106.2		15.7
Nuts per Palm	15.5	16.3	16.1	14.7		14.4	16.3	15.3	16.6		
Weight of nuts.											
Percentage of General Mean	104.7	97.6	104.5	92.4		94.5	104.4	100.4	99.8		
Pounds per Palm	39.5	36.9	39.5	34.9		35.7	39.4	37.9	37.7		37.7 lbs.
Unit weight of nut. Pounds Derived from Means	2.54	2.26	2.46	2.37		2.48	2.43	2.51	2.27		2.40 lbs.
Unit weight of "ideal" nut Pounds	2.56	2.46	2.42	2.32	0.29 "Z" not significant	2.51	2.41	2.49	2.30	0.20 "Z" not significant	2.43 lbs.

Estate B.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance	N P K	L N P K	Lime	Control	Minimum difference for significance	General Mean
No. of nuts	61.1	78.7	134.6	125.6		100.0	112.5	88.1	99.3		
Percentage of General Mean	5.0	11.1	10.4	6.5		8.3	9.3	7.3	8.2		8.3
Nuts per Palm											
Weight of nuts.	64.2	83.0	127.0	125.5		98.1	116.6	94.1	90.6		
Percentage of General Mean	11.9	23.4	23.1	15.3		18.0	21.5	17.4	16.7		18.4
Pounds per Palm											
Unit weight of nut. Pounds Derived from Means	2.38	2.11	2.22	2.32		2.16	2.31	2.38	2.03		2.21
Unit weight of "ideal" nut Pounds	2.35	2.35	2.30	2.30	0.40 "Z" not significant	2.28	2.30	2.45	2.27	0.18 0.14 "Z" not significant	2.33

Estate C.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance	N P K	L N P K	Lime	Control	Minimum difference for significance	General Mean
No. of nuts											
Percentage of General Mean	89.3	100.0	103.7	107.0		100.5	91.0	109.4	99.2		24.2
Nuts per Palm	21.5	24.2	25.6	25.8		24.5	22.1	26.2	24.0		
Weight of nuts.											
Percentage of General Mean	94.2	95.3	104.8	105.6		98.2	90.9	108.4	102.6		48.1
Pounds per Palm	45.2	45.8	50.4	50.8		47.2	43.7	52.1	49.3		
Unit weight of nut. Pounds Derived from Means	2.10	1.89	1.97	1.97		1.93	1.98	2.06	2.05		1.99
Unit weight of "ideal" nut Pounds	2.10	1.89	1.98	2.03	0.36 "Z" not significant	1.94	1.99	1.98	2.18	0.13 0.11 "Z" not significant	2.00

Estate D.

	Cover shaded	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance	N P K	L N P K	Lime	Control	Minimum difference for significance	General Mean
No. of nuts											
Percentage of General Mean	93.7	86.5	107.5	112.5		93.3	97.8	99.4	109.6		16.7
Nuts per Palm	15.6	14.4	17.9	18.8		15.6	16.3	16.6	18.2		
Weight of nuts.											
Percentage of General Mean	93.6	84.0	113.1	109.3		90.2	98.4	102.8	108.7		30.8
Pounds per Palm	28.8	25.8	34.7	35.5		27.7	30.2	31.6	32.4		
Unit weight of nut, Pounds Derived from Means	1.84	1.79	1.94	1.87		1.77	1.86	1.90	1.89		1.84
Unit weight of "ideal" nut Pounds	1.86	1.78	1.95	1.79	0.33 "Z", not significant	1.77	1.87	1.92	1.83	0.15 0.13 "Z", not significant	1.85

Estate E.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance	N P K	L N P K	Lime	Control	Minimum difference for significance	General Mean
No. of nuts											
Percentage of General Mean	104.6	89.0	105.3	101.2		97.9	108.1	96.1	98.1		
Nuts per Palm	17.9	15.2	17.9	17.2		16.7	18.3	16.3	16.7		17.1
Weight of nuts.											
Percentage of General Mean	109.1	88.9	104.5	97.6		97.5	104.8	95.6	101.6		
Pounds per Palm	41.7	34.3	40.4	37.4		37.4	40.2	36.7	38.9		38.3
Unit weight of nut. Pounds Derived from Means											
	2.33	2.25	2.24	2.18		2.24	2.20	2.26	2.32		2.24
Unit weight of "ideal" nut Pounds											

Not calculated, differences small.

Estate F.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance	N P K	L N P K	Line	Control	Minimum difference for significance	General Mean
No. of nuts	91.8	81.5	129.0	98.4		100.8	97.6	109.6	91.9		
Percentage of General Mean	10.8	9.7	15.3	11.7		11.9	11.6	13.0	10.9		11.9
Nuts per Palm											
Weight of nuts.	96.6	81.0	125.4	96.9		96.5	101.3	112.5	89.3		
Percentage of General Mean	26.1	21.9	33.8	26.1		26.0	27.3	30.3	24.1		27.0
Pounds per Palm											
Unit weight of nut. Pounds Derived from Means	2.39	2.25	2.21	2.23		2.18	2.35	2.33	2.21		2.27
Unit weight of "ideal" nut Pounds	2.43	2.25	2.21	2.23	0.57 "Z" not significant	2.18	2.41	2.37	2.19	0.181 .014 "Z" not significant	2.29

Estate G.

	Cover slashed	Cover buried	Clean weeded & cultivated	Clean weeded only	Minimum difference for significance	N P K	L N P K	Line	Control	Minimum difference for significance	General Mean
No. of nuts											
Percentage of General Mean	97.0	100.8	97.1	105.2		100.8	96.4	101.2	101.7		13.3
Nuts per Palm	12.9	13.4	12.9	13.9		13.4	12.8	13.4	13.1		
Weight of nuts.											
Percentage of General Mean	93.4	101.0	106.2	99.3		104.2	98.2	98.5	99.3		37.9
Pounds per Palm	35.4	38.3	40.3	37.7		39.6	37.2	37.4	37.7		
Unit weight of nut. Pounds Derived from Means											
	27.4	2.89	2.96	2.90		3.00	2.84	2.79	2.88		2.81
Unit weight of "ideal" nut Pounds	27.4	2.76	2.84	2.81	0.41 "Z" not significant	2.80	2.90	2.74	2.72	0.23 0.18 "Z" not significant	2.79

Table VI.
Sub-means of Estate B.

	Cover Slashed		Cover buried		Clean weeded & Cultivated		Clean weeded	
	Percentage of General Mean	Nuts per palm	Percentage of General Mean	Nuts per palm	Percentage of General Mean	Nuts per palm	Percentage of General Mean	Nuts per palm
			1 9 3 1					
N P K	100.7	13.2	85.4	11.2	59.2	7.8	100.0	13.1
L N P K	107.9	14.1	49.6	6.5	147.5	19.3	93.1	12.2
Lime	66.8	8.8	155.6	20.4	62.5	8.2	63.5	8.3
Control	73.5	15.4	179.0	23.4	125.5	16.4	130.3	12.1
			1 9 3 3					
N P K	56.9	21.6	58.4	22.2	111.9	42.6	127.6	48.5
L N P K	74.5	28.3	73.0	27.8	182.3	69.3	150.7	57.3
Lime	47.8	18.2	100.3	38.1	110.5	42.0	136.4	51.9
Control	55.0	15.5	87.9	33.4	138.4	52.6	102.9	39.1
			First half 1934.					
N P K	78.6	5.4	43.0	2.9	106.0	7.3	161.7	11.1
L N P K	99.6	6.8	77.7	5.3	188.3	12.9	102.3	7.0
Lime	50.3	3.4	116.1	7.9	97.8	6.7	109.2	7.5
Control	60.3	4.1	77.7	5.3	128.9	8.8	101.5	6.9
			y-bx 1934/31.					
N P K	39.1	15	43.3	16	101.4	38	109.9	42
L N P K	55.5	21	72.1	27	156.2	59	134.3	51
Lime	36.0	14	72.8	28	99.4	38	125.2	48
Control	42.0	16	56.2	21	116.2	44	89.8	34

Z for interaction, i.e. differential response, is not significant.

Table VII
Giving Certain Values derived by Statistical Analysis.

Surface Treatments			Manurial Treatments	
			Estate A.	
Nut Counts 1931	Standard Deviation		13.0 %	24.2 %
Nut Counts 1933	S D Z r		14.7 0.51 (3.9 for significance)	19.3 0.52 (2.9 for significance)
$y - bx \frac{33}{31}$	b	+	0.61	+ 0.40
	S D Z r		11.8 0.27 (4.1 for significance)	16.6 2.6 (2.9 for significance)
1933 $\frac{3 \text{ harvests}}{12 \text{ harvests}}$	b	+	0.92	+ 1.05
1933 Unit weight	S D Z r		0.18 1.01 (3.9 for significance)	0.27 1.95 (2.9 for significance)
			Estate B.	
Nut Counts 1931	S D		40.9	74.3
Nut Counts 1933	S D Z r		21.8 3.9	27.8 2.8
$y - bx \frac{33}{31}$	b	+	0.41	+ 0.22
	S D Z r		10.6 52.1	22.8 6.8
1933 $\frac{3 \text{ harvests}}{12 \text{ harvests}}$	b	+	1.03	+ 1.05
1933 Unit weight	S D Z r		0.23 0.80	0.24 1.82
			Estate C.	
Nut Counts 1931	S D		3.9	11.3
	Z r		1.8	1.6

Nut Counts 1933	Surface Treatments		Manurial Treatments
	S Z	D r	
			4.6 4.8
			15.7 2.5
$y-bx$ $\frac{33}{31}$	b	+	0.51
	S Z	D r	3.9 5.2
			11.4 1.7
1933 $\frac{3 \text{ harvests}}{12 \text{ harvests}}$	b	+	0.33
			+ 1.20
1933 Unit weight	S Z	D r	0.21 2.85
			0.18 1.69
Estate D.			
Nut Counts 1931	S Z	D r	9.2 2.02
			20.3 0.82
Nut Counts 1933	S Z	D r	11.7 1.66
			16.9 1.09
$y-bx$ $\frac{33}{31}$	b	+	0.64
	S Z	D r	9.7 2.62
			12.8 1.74
1933 $\frac{3 \text{ harvests}}{12 \text{ harvests}}$	b	+	1.01
			+ 0.80
1933 Unit weight	S Z	D r	0.19 1.90
			0.21 1.41
Estate E.			
Nut Counts 1931	S Z	D r	11.2 0.39
Nut Counts 1933	S Z	D r	9.0 2.95
			15.2 2.6
$y-bx$ $\frac{33}{31}$	b	+	0.48
	S Z	D r	6.8 4.2
			not determined.

	Surface Treatments			Manurial Treatments
1933 $\frac{3 \text{ harvests}}{12 \text{ harvests}}$	b	+	0.72	+ 0.70
1933 Unit weight	S D	not determined.		
	Z r			
Estate F.				
Nut Counts 1931	S D		17.7	27.3
	Z r		0.43	0.59
Nut Counts 1933	S D		15.2	26.0
	Z r		3.43	1.32
y-br $\frac{33}{31}$	b	+	0.58	+ 0.60
	S D		10.2	19.3
	Z r		6.26	1.32
1933 $\frac{3 \text{ harvests}}{12 \text{ harvests}}$	b	+	0.82	+ 0.79
1933 Unit weight	S D		0.33	0.24
	Z r		1.53	4.12
Estate G.				
Nut Counts 1931	S D		23.3	33.3
	Z r		0.05	0.09
Nut Counts 1933	S D		23.2	27.0
	Z r		0.05	0.29
y-br $\frac{33}{31}$	b	+	0.68	0.48
	S D		14.2	21.3
	Z r		0.28	0.65
1933 $\frac{3 \text{ harvests}}{12 \text{ harvests}}$	b	+	1.28	+ 0.77
1933 Unit weight	S D		0.23	0.31
	Z r		0.53	1.16

THE RELATIONSHIP BETWEEN WEIGHTS OF COCONUTS, HUSKED NUTS AND "MEAT"

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The reason for this investigation has been explained on the third page of the preceding paper in this number on Cultivation and Manuring of Coconuts; the work was carried out in 1932. In *Tropical Agriculturist* for February, 1934, the results of a similar investigation are given by Pieris.

Procedure.

In carrying out these investigations a total of 936 freshly collected coconuts from three estates have been weighed to the nearest gramme, individually, nut by nut; each coconut in turn was weighed, husked, weighed again, and split, after which the meaty tissue in the half nuts was gouged out and the pieces were carefully collected and weighed.

On the first estate, an area of healthy palms, 18 years old, yielding large nuts, was selected and from the crop, indiscriminately collected from the palms, only the fully ripe, brown nuts were selected for examination. In all 400 nuts were examined on this estate.

The same procedure was repeated on the second estate where a good yielding block was selected and 430 ripe brown nuts, indiscriminately collected from a block of palms 17 years old, were examined.

On the third estate, the procedure was varied. In this instance 106 coconuts, of mixed ripeness, collected from an area planted 32 years previously and yielding small nuts, were examined.

Finally, 100 husked nuts of mixed ripeness collected from various small holdings in the coastal district of Kuala Selangor were weighed, split and weighed again; after which the meat was extracted and weighed. The object in this instance was to ascertain whether nuts grown under a wide range of conditions would show a wider range of variability and whether it was necessary to split the husked nuts in order to rule out possible variation due to the amount of water contained in each nut.

The relevant figures are as follows:—

	Mean Weight grammes		Standard Deviation
First Estate (400 nuts)			
Fruit	1882	+	283
Husked nut	1227	+	236
Meat	515	+	81

	Mean Weight grammes		Standard Deviation
Coefficient of correlation			
$\frac{\text{Fruit}}{\text{Meat}}$	+ 0.767		
$\frac{\text{Husked Nut}}{\text{Meat}}$	+ 0.770		
<i>Second Estate (430 nuts)</i>			
Fruit	1809	+	289
Husked nut	1212	+	208
Meat	510	+	87
Coefficient of correlation			
$\frac{\text{Fruit}}{\text{Meat}}$	+ 0.704		
$\frac{\text{Husked Nut}}{\text{Meat}}$	+ 0.817		
<i>Third Estate (106 nuts)</i>			
Fruit	1783	+	258
Husked Nut	1114	+	197
Meat	467	+	61
Coefficient of correlation			
$\frac{\text{Fruit}}{\text{Meat}}$	+ 0.676		
$\frac{\text{Husked Nut}}{\text{Meat}}$	+ 0.762		
<i>Kampong (100 nuts)</i>			
Fruit	Not available		—
Nuts, husked	1081	+	187
Nuts, husked and split	734	+	107
Meat	464	+	79
Coefficient of correlation			
$\frac{\text{Nuts}}{\text{Meat}}$	+ 0.840		
$\frac{\text{Split Nuts}}{\text{Meat}}$	+ 879		

It will be seen that there is high correlation especially between weight of husked nut and meat and that the splitting of nuts is not essential.

NOTES ON THE OIL PALM IN MALAYA WITH SPECIAL REFERENCE TO FLORAL MORPHOLOGY

BY

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In preparation for a series of experiments in connexion with pollination of oil palms, notes were made on the general structure and habits of growth of the oil palm in Malaya; in particular, careful observations were made on the appearance and subsequent development of the male and female inflorescences including details of the morphology of male and female flowers and the development of the fruit.

The oil palms grown on estates in Malaya are of the "Deli" type (*Elaeis guineensis* var *communis*, forma* *dura*, Becc.) and it is with such palms that these observations and experiments are concerned.

The climate of Malaya, with an average annual rainfall of from 80 to over 100 inches and a mean daily temperature of about 80°F, provides very favourable conditions for the growth of oil palms (1) (2).

A member of the natural order Palmae, and closely related to the coconut palm, the oil palm, though at first somewhat slower in growth than the former, usually also attains considerable height. Some palms, however, form very thick stems with proportionately reduced upward growth.

The erect columnar stem, is usually between 18 inches and 24 inches in diameter and is said to be capable of reaching heights of between 50 and 100 feet. (2) (3) (4).

The average height of stems of 10 year old palms in local estates is about 100 feet, but apart from differences of type, heights of palms may vary a good deal according to the fertility of soil.

The palms are monoecious, and the usually unisexual inflorescences are produced in the axils of the leaves.

Palms usually come into bearing about the fourth year after planting, that is, when between four and five years old, and reach maturity between the tenth and twelfth years.

From the seedling stage up to the age of about 5 years, the young palm has a very bush-like appearance with a large number of leaves on a stem which is still so short that the tips of the oldest leaves often touch the ground, as they hang outwards.

*The writer has not seen a copy of Beccari's work published in 1914, (13) but he is usually quoted as giving *dura* the importance of a "sub-variety". The above modification follows Janssen's use of "forme", (14) but with more limited application of his *forme dura*, and, is more correct, the writer thinks, in view of the parallel variation in thickness of shell in all varieties of *Elaeis*.

As the palm grows, it assumes a more typical appearance with pillar-like stem and a terminal crown of large elliptic, pinnate leaves. The youngest leaves in the centre of the crown are erect while the older leaves, in succession, hang further outwards all round, the oldest leaves hanging obliquely downwards.

The fresh leaves are dark green in colour and on mature palms are 16 to 22 feet long, including petiole.

The petioles are between 3 and 4 feet long, about 2 inches across at the distal end and widening downwards until greatly broadened at the base. They are tough, plano-convex in section, and are armed along both edges with short strong thorns, which at an earlier stage were the bases of the ribs of fibrous sheaths protecting the shoot.

It is very noticeable that palms differ as regards the colour of their petioles, some being green and some brown, while others are of an intermediate shade or shades.

Some investigators have found a correlation between green petioles and high yield (9) which has not been found locally.

The pinnæ are attached to the rachis of the leaf in two slightly divergent ranks on each side; they are 1 to 2 inches wide and are 30 to 40 inches long at the widest part of the leaf, a little beyond half-way from the petiole to the tip, and successively shorter towards each end; and they are turned gradually more forwards or upwards towards the tip.

The pinnæ on the right-hand side (facing the palm) of a mature leaf are usually an inch or so longer than the pinnæ on the other side.

The time at which a young leaf commences to open out its laterally-compressed pinnæ may be regarded as the occasion of its first appearance as a young leaf in the centre of the crown. (7).

Normally, leaves wither about 18 to 21 months from this first appearance, having become in that time the oldest leaves at the bottom of the crown and being no longer required by the palm.

In the particular case of a leaf subtending a fruit bunch, the leaf dies a month or two after the fruits have ripened.

Dead leaves, particularly when the palms are fairly young, do not readily fall away owing to the tough sheathing bases of the petioles adhering tenaciously to the stem, overlapping one another. They gradually wither and disintegrate, leaving a portion of the base of the petiole on the stem of the palm.

The usual practice on estates is to cut off all dead leaves, and any others immediately below or supporting a ripe bunch, in order to facilitate harvesting and inspection.

Excessive pruning or damage to leaves, however, reduces the total area of leaf surface and therefore curtails the supply of carbohydrate food material which is formed in the leaves by the assimilation of carbon dioxide from the air. This has an adverse effect on the development of fruit bunches. It also has the effect of accelerating the production of young leaves, which causes an

increased rate of growth in height, necessarily at the expense of the girth of the stem then being formed. It thus causes attenuation of the stem, as well as a reduction in the reserves and the strength of the palm, from the effects of which it may not quickly recover, especially if the palm is immature. (10).

From the age of about 10 years the palm has a crown of from 30 to 50 leaves with a spread of from 25 to 30 feet in diameter and produces from 18 to 30 new leaves per annum, in either clockwise or anti-clockwise direction, more usually the latter, at intervals of approximately 137° so that eight oblique series of leaves are formed up the stem of the palm. (3) (5).

In the axils of between 60 and 70 per cent. of the leaves mature male or female inflorescences are developed, (6) while aborted inflorescence buds are sometimes found, on dissection, between the stem and the closely adpressed bases of the petioles of other leaves, and it is not unreasonable to assume that a potential inflorescence is formed in the axil of each leaf.

Inflorescences are developed excentrically in the axils of the leaves, lying either to the right or left according to the clockwise or anti-clockwise arrangement of the leaves, and protrude from the side of the base of the petiole.

Although oil palms are monoecious, they usually display mature inflorescences of only one sex at a time, and produce them in definite alternating phases which may be of equal or unequal lengths and numbers of inflorescences.

The alternating male and female phases are sometimes of about four months each, but they are not generally of this length nor of equal lengths for both sexes. Some palms produce inflorescences of one sex (rarely both) for periods of as long as twelve months or more. (11).

The lengths of these phases are usually fairly constant for individual palms but vary widely from palm to palm. Nevertheless, the total numbers of male and female inflorescences produced on an average stand of palms are approximately equal in an aggregate over sufficient length of time.

The proportions of male and female inflorescences per palm seem to be an expression of a definite genetical constitution, but the development and appearance of female inflorescences is probably governed to a considerable extent by the fertility of the soil and the amount of rainfall. (4).

At the time of change of phase, one or two inflorescences bearing both male and female spikes are sometimes found on a palm and it occasionally happens that the first inflorescences of a succeeding phase, though later in origin, may, by more rapid development, attain to maturity before the last inflorescences of the preceding phase. It also, apparently, happens that a series of inflorescences of one sex is followed by a single inflorescence of the other sex; then a single inflorescence of the first sex before; finally, it is followed by the series of inflorescences of the other sex.

It is very seldom, however, that a male inflorescence and female inflorescence are in flower together on the same palm.

The habit of overlapping appears, from present observations, to be typical of individual palms, but others have well defined male and female phases.

From the above observations, it will be realised that cross-pollination is the normal means of securing fertilisation, but that self-pollination, though probably very rare, is also possible. It is, at any rate, capable of producing viable seed, but whether it has an adverse effect on resulting progeny is as yet undetermined. Seedlings of controlled "selfings" are now being planted out for experimental purposes.

Floral Morphology.

As has been mentioned, the inflorescences are produced in the axils of the leaves, but their presence is not apparent until the apex of the inflorescence emerges above the base of the leaf petiole; at first the inflorescences are each enclosed in two spathes or sheathing bracts, the outer of which bursts about a month after it has fully emerged above the base of the petiole, while the inner sheath elongates with the inflorescence and splits, on an average, 16 days after the bursting of the first sheath, on a female inflorescence, and 20 days after, in the case of a male inflorescence.

From this point, the female inflorescence usually takes longer than the male to reach maturity, but they both commence flowering in all at about 40 days from the bursting of the first sheath.

The Female Inflorescence.

The young female inflorescence continues to expand after splitting the inner sheath until it is a large oval "head" of about 12 inches long by 8 inches wide and 6 inches deep with between 100 and 200 spikes, bearing sessile female flowers and arising in spiral arrangement from a short central axis. The female flowers are fairly widely spaced along the spikes, the apices of which form large tough spines. Between 3,000 and 6,000 flowers are carried on the whole inflorescence.

The stalk of the inflorescence, arising in the axil of the leaf, is oval in section, being somewhat compressed between the base of the petiole and the stem of the palm, and is from 7 to 9 inches in girth. It is 10 to 12 inches long, but only about half of this is conspicuous above the base of the petiole. The female inflorescence is therefore not much elevated, and the fibrous remains of the inner sheath more or less encumber the base of the female inflorescence, thereby covering some of the lower-placed flowers and making them almost inaccessible to the wind-borne pollen.

An inflorescence protruding from one side or the other of the petiole of the subtending leaf, rests, when fully expanded, on the petiole of an older leaf in the next series. This petiole, later, provides necessary support for the bunch when weighted with fruits.

Each female flower is slightly sunk in the axis of the spike and is protected by a bract, the apex of which is sharp and thorn-like. These bracts are firmly

connected to the central axis and each is united with the adjoining bracts, so that a continuous shield is formed for the flowers on each spike.

The flower is about 14 mm. long by 8 mm. in diameter and consists of a large, syncarpous, tricarpellary ovary with a deeply divided trifid stigma on a very short style; a rudimentary staminal disc; three petals; three alternating sepals and two or three bracteoles. The petals, sepals and bracteoles are all sub-coriaceous and scale-like and enlarge with the developing fruit. Very rarely flowers with four perfect carpels are found.

During development of the flower, two bracteoles usually each split off one wing which becomes separated from the main portion by a distance of about a third of the circumference of the flower base, and develops as a thin rod of tissue.

The three stigma lobes are thick and fleshy and white, about 6 mm. long when mature, and triangular in section, fitting closely together when immature. Each lobe has, along its inner angle, a very fine and fairly deep groove, on both sides of which are small glandular hairs; often one side, usually the left, is more hairy than the other. (8).

At maturity, and when the stigmas have pushed their way out of the enclosing perianth and are receptive, these lobes bend outwards, exposing the hairy inner angles for retention of pollen.

As the flowers become receptive, their temperature rises considerably and they give off a mild scent of aniseed, which seems to come most distinctly from between the bases of the lobes of the stigmas. At the same time, there is exudation of moisture along the grooved inner edge of each lobe. The secretion of moisture along the stigma lobes at receptivity is a not uncommon phenomenon in wind-pollinated flowers, and helps in the retention and rapid germination of the pollen grain.

The day after the flowers have fully matured, the tips of the stigma lobes turn pink and the colour spreads and deepens as the period of receptivity passes, until, soon after this is over, the whole stigma is deep purple in colour and is drying up.

The female inflorescence is in flower for four or five days with the majority of flowers opening on the first and second days, but the period of receptivity of individual flowers has been recorded as lasting for three days. (12).

The ovary of the female flower has, normally, three ovules of which, usually, one is fertilised and develops into a seed, while the other two atrophy. Occasionally, however, two, and more rarely three, seeds are formed.

After fertilisation of the ovum and the secondary nucleus in the embryo sac of the ovule, the normal cytological development takes place and the ovule eventually develops to form the egg-shaped seed, consisting of a comparatively thin seed coat and a solid kernel, which in turn comprises a viable embryo and a quantity of reserve food material or endosperm.

The stimulus following fertilisation is carried to the walls of the carpels and they develop to form a protective coat or pericarp, of which the inner portions or endocarp, becoming cemented with stone cells, form a very hard shell which surrounds the seed, while the outer layer or exocarp becomes succulent and oil-containing.

When two or three seeds are developed they remain entirely separated from each other, being individually surrounded by the hardened endocarp of their respective carpels.

In the apical portion of the shell there are three germination pores corresponding to the three carpels of the ovary, and directly above the embryos of the seeds within.

In the normal case, where only one seed is formed, two small flattened cavities can be found in the shell immediately below two of these germination pores, marking the relics of the two atrophied ovules.

The respective proportions of the whole ripe fruit are as follows:—

Exocarp or "pericarp" from 50 to 70 per cent.

Endocarp or shell from 20 to 40 per cent. and

seed or "kernel" from 3 to 13 per cent.

The shell of the "dura" form is from 2 mm. to 5 mm. thick. (3) (15).

A bunch of ripe fruit may weigh from a few lbs. up to 150 lbs. or so, according to the number of flowers successfully pollinated and to the fertility of the soil.

An average good bunch weighs from 30 to 40 lbs. and contains from 800 to 1,000 fruits in a large head armed with the more or less protuding spine-like apices of the numerous spikes.

When ripe, the fruits on the lower parts of the spikes, hidden inside the bunch, are bright orange in colour and are compressed into various angular shapes; the fruits on the outside, nearer the tops of the spikes, are larger and somewhat pear-like in form. These are generally $1\frac{1}{2}$ to 2 inches in length and 1 to $1\frac{1}{2}$ inches in diameter; full and round and of a dark brownish purple colour, with a bright orange and slightly angular compressed base.

The Male Inflorescence.

The male inflorescence, after bursting the inner sheath, grows further out and displays a panicle of finger-like spikes radiating from the central axis. On an average, there are about 100 fingers or spikes in each inflorescence. There are from 900 to 1,500 flowers on each spike, densely crowded, in a left to right spiral arrangement, forming a smooth, cylindrical or slightly club-shaped "finger" of about 6 to 8 inches long and $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in diameter.

The stalk of the male inflorescence is longer than that of the female, being from 15 to 18 inches in length, so that the mature male inflorescence is raised prominently above the base of the petiole and fairly well exposed.

The male flowers which are much smaller than the female, being about 4 mm. long by 2 mm. broad, have six stamens with large bilobed anthers dorsifixed on short filaments, which are united at the base to form a thick cup-like disc, surrounding a degenerate ovary with much reduced stigma. The stamens are enclosed by three scale-like petals and three almost similar sepals.

Each flower is sunk in the fleshy axis of the spike and protected by a bract which ends in a small hardened point. These bracts are united with the axis of the spike and with each other, forming a perforated sheath for the flowers, in like manner to that formed by the bracts on spikes of female inflorescences, but enveloping the flowers more completely.

The axes of the spikes of male inflorescences form at their apices tough, short spines, much less formidable than those of the spikes of female inflorescences.

When the flowers are mature, the staminal disc grows to form a tube, finally much more than half the height of the thus lengthened stamens, which emerge from the bractical envelope, bending outwards, so that the anthers eventually face upwards in star-shaped arrangement. The anthers open along the outwardly inclined inner edges of the lobes, and when fully open, expose a vast amount of pollen over the whole inflorescence.

The pollen is pale yellow in colour in bulk, is dry, and smells strongly of aniseed while fresh. The individual grains are tetrahedral in form with one face larger than the others, making a regular pyramid, the height of which is equal to, approximately, half the length of one of the sides of the triangular base, the sides of which are 35μ in length. Very rarely pentahedral pollen grains are found, with a square base and four pyramidal sides.

Raphides of calcium oxalate in fairly large numbers are found amongst the pollen grains; they are probably a final product of metabolism accompanying the ripening of the anthers, and appear to be functionless.

Male inflorescences are in flower for about five days with most of the flowers opening on the second and third days.

It has been recorded in Sumatra that female flowers commence to open at about 4 a.m. No records of this nature have been made in this instance, but it has been noticed that flowers on male inflorescences often open between midnight and 2 a.m.

A few notes have been made on insect visitors but these will be included in a second article on means of pollination.

References.

1. A. von Humbolt "Aspects of Nature" Vol. II, London 1849
2. H. C. Billows and "Palm Oil and Kernels" 1913
H. Beckwith

3. Dr. E. Fickendey and H. N. Blommendaal "Olpalme" Hamburg 1929
4. T. G. Mason and G. S. Lewin "Growth and correlation in the Oilpalm" Ann. Applied Biology 1925
5. F. C. van Heurn "Vetbepalingen bij Oliepalmvruchten" Algemeen Proefst. der A. V. R. O. S. Algemeene Serie No. 6 1919
6. Agriculturist, Department of Agriculture, S.S. and F.M.S. Unpublished records
7. C. Yampolsky "A contribution to the study of the Oilpalm" Bulletin du Jardin Botanique de Buitenzorg 1922
8. P. Hyac Vanleryst "Etude botanico. agronomique des organes reproducteurs de l'Elacis" Bulletin de l'Association des Planteurs de Caoutchouc Vol. X 1923
Vol. XI 1924
9. E. Stoffels "Contribution à l'étude de la selection de l'Elacis guineensis à Sumatra". Bruxelles 1934
10. H. B. Waters "Notes on a visit to the Oilpalm Plantations of Sumatra and Malaya in 1926" Sixth Ann. Bull. Dept. of Agric. Nigeria 1927
11. E. H. G. Smith "The Oilpalm at Calabar" Eighth Ann. Bull. Dept. of Agric. Nigeria 1929
12. Dr. A. A. L. Rutgers and others "Investigations on Oil Palms" A. V. R. O. S. Medan 1922
13. O. Beccari "Contributo alla conoscenza della Palma a olio" *L'Agricoltura Coloniale* 1914
14. Paul Janssens "Le Palmier à Huile au Congo Portugais et dans l'enclave de Cabinda", Memoires et Rapports sur les Matières Grasses. Le Palmier à Huile. Tome III 1928

15. J. G. J. A. Maas La Culture et la Selection du Palmier Elaeis aux Indes Netherlandaises" Memoires et Rapports sur les Matières Grasses. Le Palmier à Huile. Tome III 1928
 - Jacques de Briey "Le Palmier à Huile au Mayumbe" Memoires et Rapports sur les Matières Grasses. Le Palmier à Huile. Tome II 1922
 - Bunting, Eaton and Georgi "The Oil Palm in Malaya" Department of Agriculture, S.S. and F.M.S., Kuala Lumpur. 1927
 - E. Mathieu "The Oil Palm (*Elaeis guineensis*) in the East" Gardens Bulletin, Straits Settlements. Vol. II, No. 7. Singapore, 1920
 - Dr. E. Fickendey "Die Kultur die Olpalme" Berlin. 1924
 - Aug. Chevalier "Documents sur le Palmier à Huile". Paris. 1910
 - Jean Adam "Le Palmier à Huile" Paris. 1910
 - E. Annett "Le Palmier à Huile au Cameroun et en Afrique Tropicale" Paris. 1921
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CONDITIONS ON SMALL RUBBER HOLDINGS IN MALAYA.

3rd Quarter, 1934.

*Prepared by the Economics Branch of the Department of Agriculture,
Straits Settlements and Federated Malay States, in collaboration
with the Field Branch of the Department.*

Rainfall.

In the north of the Peninsula heavy rains were experienced throughout the quarter, flooding being general in all districts of Province Wellesley and Penang in September.

Rainfall was normal for the time of year in most other parts of the country. In North Johore dry weather continued throughout the quarter and in Negri Sembilan weather conditions were generally dry during July and August. Heavy rainfall was experienced throughout Malaya in September.

Prices.

There was a continued steady improvement in the prices paid for small-holders' rubber during the quarter under review, not so marked, however, in September when prices tended to remain at the August level.

Table I shews the lowest and highest prices at which rubber was purchased by dealers in each State. It will be noticed that although in a few cases there is a considerable difference between the extremes, the variation, on the whole, is within narrower limits than earlier in the year.

An additional table (II) is again given, shewing the mean of lowest and highest prices paid at a number of centres in each State during the quarter.

Sales of scrap rubber remained small, as noticed in the report of the second quarter, but in Kedah unfavourable climatic conditions led to larger quantities being sold in some places.

Tapping.

Tapping systems generally have taken a more conservative trend since the introduction of restriction; and in the case of Malay holdings in many areas, the preparation and planting of padi fields have prevented excessive tapping.

Owing to wet weather in Kedah, excessive tapping took place when days were fairly fine; some improvement in tapping methods was observed in South Kedah as a result of the work of the newly appointed Asiatic Rubber Instructor. In the Muar District of Johore it was reported that, since the advent of rubber regulation, several holdings of immature rubber had been brought into tapping earlier than advisable, the owners desiring to obtain a coupon allowance for such holdings.

Table I.
Lowest and Highest Rubber Prices Paid by Local Rubber Dealers.
(In Straits dollars per picul (133 1/3 lbs.))

3rd Quarter 1934.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
				JULY				
Smoked sheet	24.50-29.00	24.00-29.00	25.50-30.30	24.00-30.00	23.00-30.00	26.00-30.00	25.00-29.00	24.00-30.00
Unsmoked sheet	21.50-28.00	22.00-27.00	12.00-27.00	22.00-28.00	19.00-28.20	24.00-28.00	20.00-27.80	20.00-29.00
Scrap	—	6.00-12.00	6.00-17.00	—	—	16.00-17.00	10.00-14.00	11.50-11.00
				AUGUST				
Smoked sheet	26.00-31.00	25.00-31.83	26.00-32.00	27.00-32.00	21.70-31.60	27.00-31.00	28.00-30.50	24.00-31.00
Unsmoked sheet	23.00-29.50	24.00-28.50	20.00-27.40	24.00-29.50	19.50-29.50	25.00-30.00	25.00-29.00	21.00-29.50
Scrap	—	8.00-15.00	13.00-20.00	—	—	15.00-17.00	12.00-15.00	12.00-16.00
				SEPTEMBER				
Smoked sheet	27.00-32.00	23.15-31.83	28.00-32.00	27.00-32.00	23.00-31.60	28.00-31.00	28.00-31.00	27.00-31.50
Unsmoked sheet	25.00-30.00	24.50-29.00	25.00-28.00	25.00-30.00	18.50-29.50	27.00-30.00	24.00-29.50	23.00-29.80
Scrap	4.00-16.00	9.00-13.50	14.00-18.00	12.00-17.00	11.50*	14.00-18.00	5.50-15.00	12.00-17.50

* at one centre only.

†\$1.50 and \$2 at one centre only.

Table II.
Mean of Lowest and Highest Rubber Prices Paid by Local Dealers
at a number of Centres in each State.
(In Straits dollars per picul (133 1/3 lbs.))

3rd Quarter 1934.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
				JULY				
Smoked sheet	28.50-28.50	26.30-27.84	25.98-27.83	26.10-29.88	24.62-28.70	26.66-29.00	26.25-28.50	25.50-27.55
Unsmoked sheet	24.30-27.10	23.76-25.72	21.75-24.00	23.83-27.25	22.72-27.24	24.66-27.00	23.75-26.70	22.75-25.75
Scrap	—	6.00-12.00	10.00-12.50	—	—	18.00-17.00	11.00-13.00	5.75-6.50
				AUGUST				
Smoked sheet	28.12-29.63	28.01-29.86	27.75-34.48	28.10-30.85	25.53-30.05	27.66-30.33	28.38-29.63	27.15-28.32
Unsmoked sheet	26.10-28.10	25.58-27.30	23.83-25.80	26.08-28.66	23.56-28.16	25.66-28.66	26.00-27.25	25.17-27.67
Scrap	—	8.00-15.00	13.50-18.00	—	—	15.00-17.00	13.25-14.25	10.43-12.53
				SEPTEMBER				
Smoked sheet	28.25-30.25	28.54-30.60	28.58-30.67	28.50-31.50	26.13-30.58	28.66-30.33	29.38-30.75	28.32-29.02
Unsmoked sheet	26.60-28.70	26.42-28.00	25.75-27.70	26.33-29.16	23.60-28.76	27.00-29.33	26.63-28.50	25.57-28.04
Scrap	8.00-10.00	9.00-15.60	14.33-16.33	12.47-15.83	11.50*	15.32-16.66	11.00-12.88	10.94-13.12

*at one centre only.

Areas out of Tapping.

Estimates of areas untapped on small holdings were again obtained by counting the number of such areas and applying the percentage thus obtained to the total area of small holdings in the District.

Table III shews the results of the survey in September, and it will be seen that more areas have come into tapping again as conditions under rubber regulation became more stable.

The total of areas out of tapping on estates of less than 100 acres in the Federated Malay States, as at the end of September 1934, was estimated by the above system to be 42,600 acres as compared with 54,600 acres at the end of June. The total area untapped in the Straits Settlements at the end of the period under review was 13,900 acres as compared with 18,800 at the end of June. The relative figures for March, when rumours of restriction led to excessive tapping, were 34,950 acres and 9,900 acres in the Federated Malay States and Straits Settlements respectively.

Condition of Holdings.

Reports indicate that the very marked improvement in the condition of small holdings in all States has been maintained. In Krian 640 trees were lost in two areas during the storms and floods experienced in the first week of September. In the Kuala Langat District of Selangor, a number of Malay-owned smoke houses have been improved in order to better the quality of rubber produced. In the same District two new smoke houses of approved design have been constructed by Malays under the guidance of the Asiatic Rubber Instructor.

Diseases.

In Kedah, bark diseases again became very prevalent owing to the wet weather; disinfectants were extensively used for their treatment.

Mouldy rot remains the most prevalent disease in nearly all States, but it is generally kept well under control and wide use is made of approved fungicides available from the Department. In Johore an improvement is reported owing to weather conditions being unfavourable to the development of the disease. In the Krian and Selama Districts of Perak the heavy rains of August and September resulted in a marked recrudescence of the disease, further accentuated by the lack of attention given to holdings by their owners due to the incidence of padi planting operations.

A serious outbreak of pink disease was reported from Pahang and control treatment was being undertaken; a few cases were observed in Perak Central.

A sporadic outbreak of *Oidium Heveae* occurred in the Segamat District of Johore in July and was still in evidence during August and September when weather conditions were favourable to the spread of the disease. An outbreak of the disease was also reported in Selangor.

Cases of root diseases were rather frequent in Perak Central, but the damage occasioned was not extensive.

Table III
Estimated Acreage of Tappable Rubber which was out of Tapping on Holdings of less than 100 Acres, at the end of September, 1934.

PERAK				SELANGOR				NEGRI SEMBILAN				PAHANG			
District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage
Batang Padang	37,288	2,600	7	Klang	18,879	1,300	7	Seremban	19,241	2,300	12	Raub	7,361	100	1
Kinta	34,180	1,400	4	Kuala Langat	29,263	1,500	5	Tampin	17,947	2,200	12	Kuala Lipis	15,951	2,200	14
Kuala Kangsar	43,485	1,600	7	Ulu Langat	38,867	2,400†	6	Kuala Pilah	17,470	2,800	16	Bentong	13,600	3,400	25
Upper Perak	13,774	1,500	11	Ulu Selangor	36,632	2,100	7	Jeiebu	6,270	600	9	Other Districts	31,223	4,900	15
Larut & Selama	51,407	2,000	4	Kuala Lumpur	21,174	1,900†	6	Port Dickson	10,653	500	5				
Krian	9,751	1,900	20	Kuala Selangor	9,379	1,900†	6								
Lower Perak	47,937	3,400	7*												
	237,822	14,400	6		148,194	9,200	6		71,581	8,400	12		68,135	10,600	15
MALACCA				PENANG & P. WELLESLEY				SINGAPORE							
District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage	District	Total Tappable area	Total untapped area	Percentage				
Central	17,687	1,900	11	North	3,241	400	11	Singapore	12,781	400	3				
Alor Gajah	34,387	4,700	15	Central	8,067	1,000	14								
Jasin	24,571	1,500	6	South	7,149	100	1								
				Druidings	7,279	2,800	39								
				Penang	11,114	1,600	10								
	74,045	8,100	11		36,850	5,400	15		12,781	400	3				

The percentage of areas out of tapping in June 1934 was as follows:—Perak 10, Selangor 10, the Negri Sembilan 15, Penang 14, Malacca 14, Penang and Province Wellesley 20, Singapore 8.

* Estimated from percentage for Kuala Kangsar.
† Estimated from percentage for other Districts in the State.

Grades of Rubber.

The variation in the grades of rubber purchased by dealers was again considerable and separate figures for the various States are given as a more exact guide to the position. The absence of scrap from such figures is particularly noticeable.

Kedah.—The percentage of smoked sheet increased during the quarter, the increase being considerable in certain Districts. Unsmoked sheet decreased in most Districts but increased in the Kulim District and the production of scrap was negligible throughout the State. Average percentages were:—Alor Star: smoked sheet 80, unsmoked 12, scrap 8; Kuala Muda: smoked sheet 48.5, unsmoked 44.5, scrap 7; South Kedah: smoked sheet 54, unsmoked 40, scrap 6; Baling: smoked sheet 82, unsmoked 16, scrap 2.

Johore.—In this State also the tendency was to an increase of smoked sheet, the percentages in Muar, Batu Pahat and Tangkak being respectively 67, 80 and 88. In Panchor, Senggarang, Kukup and Pontian, the reverse was the case, almost the entire purchases being of unsmoked sheet. The percentage of scrap sold was negligible with the exception of Batu Pahat, Johore Bahru and Kota Tinggi, 15 per cent., and Segamat, 10 per cent.

Perak.—In the District of Krian and Selama Sub-district the closed market for scrap resulted in an increased amount of sheet rubber being manufactured. The percentages were:—Krian: smoked 30, unsmoked 70; Selama: smoked 80, unsmoked 20.

In Perak North, smoked sheet increased to 77 per cent. in Taiping, but only in Tronoh was there any other considerable amount of this grade purchased (45 per cent.). In Perak South, with the exception of Tanjong Malim (smoked 100) Chenderian (smoked 52) and Slim Village (smoked 52) the average percentages of purchases at seven centres were: smoked 19, unsmoked 81.

In Perak Central the percentage purchases were: smoked sheet 60, unsmoked 33, scrap 7.

Selangor.—Percentage figures are not available but reports state that smoked sheet was generally made in the coastal districts and both smoked and unsmoked sheet in the inland districts.

Penang, Province Wellesley and Dindings.—In Penang, sales were entirely of unsmoked sheet; in Province Wellesley also, sales were principally of unsmoked sheet, though at three centres in the Central Circle sales were entirely of smoked sheet. In the Dindings percentage purchases were:—smoked sheet 53, unsmoked 44.5, scrap 2.5.

Malacca.—The percentages of purchases were as follows:—Central: smoked sheet 66, unsmoked 17, scrap 17; Alor Gajah: unsmoked 91, scrap 9; Jasin: smoked sheet 29, unsmoked 66, scrap 5.

Negri Sembilan.—Considerable variation in the percentage of grades sold is noticeable as in the foregoing States; sales of scrap are only taken into account in the Rembau District. In the Seremban District the average percent-

age of smoked sheet was 83; in the Kuala Pilah District, average percentages for five centres were: smoked sheet 42, unsmoked 58. In the Rembau District purchases were entirely of unsmoked sheet with the exception of an average of 7 per cent. of scrap. The average percentages for the Jelebu District were: smoked sheet 60, unsmoked 40; whereas in the Port Dickson District the percentages were exactly reversed.

General.

No cases of budding of rubber were reported during the quarter and new plantings were prohibited under the rubber regulations. A few areas in Kedah were replanted and it was reported that 530 acres in Negri Sembilan had newly been brought into tapping. There was no indication of any areas being abandoned in favour of other crops.

Reports from Pahang state that many Malays in the riverine mukims of Lipis now combine and send their rubber to the nearest big town in preference to selling at lower prices to the small local dealers.

The position of the small-holder has undoubtedly improved as a result of rubber regulation and the only cases of hardship now found are those where small holdings have been leased at low rates during the depression.

The result of the work of the newly appointed Asiatic Rubber Instructors is already to be seen in an improvement in the quality of rubber produced.

AGRICULTURAL DEVELOPMENT IN JOHORE.*

General.

In point of size, Johore is the third largest administrative unit in the Peninsula, being exceeded only by Pahang and Perak. The total area is stated to be 7,670 square miles, or 4,908,800 acres. Of this, it is roughly estimated that 1,160,000 acres are under cultivation.

The area in acres under different crops in the State at the end of 1932 was approximately as follows:—rubber 854,700, coconuts 165,100, pineapples 39,300, oil palms 27,800, rice 19,300, tapioca 17,300, arecanuts 10,000, mixed fruits 8,000, coffee 4,600, bananas 6,000, derris (tuba) 1,800, gambier 1,700, tobacco 1,400, sago 1,200, other minor crops 1,000.

Johore has thus the largest cultivated area of each of the major crops grown in any one administrative unit in the country except rice, *viz.*—rubber, coconuts, pineapples and oil palms, while there is no crop of any importance grown in Malaya which is not cultivated.

This outstanding position is of comparatively recent growth and has been achieved very largely during the post-war period 1919—1930. Actual figures for areas under cultivation in Johore during earlier years are difficult to obtain and unreliable; there is, however, no doubt that development has been phenomenally rapid, and there seem to be grounds for believing that the cultivated area has very nearly doubled during the past ten years.

Johore differs from other parts of the Malay Peninsula in that it contains no central mountain chain and consists mainly of level plains and gently undulating country. It is thus peculiarly favourably situated for development. The policy of opening up the country by means of roads and railway has facilitated development and in consequence, population and capital have flowed in at a rapid rate.

The census figures are illuminating in this connexion. According to the 1931 census, the total population of the State in that year was 505,000, while at present it is estimated to be 545,000; in 1921 it was 282,000 and in 1911 180,000, the percentage increases in the two decades being:—1911—1921, 56.4 per cent., 1921—1931, 79.0 per cent.

A considerable proportion of the increase is accounted for by immigration from countries outside Malaya, the census returns shewing that between 1921 and 1931 the nett immigration amounted to 125,000 persons, or roughly 25 per

* Abstract of the Report on Agricultural Development in Johore by H. A. Tempany, C.B.E., D.Sc., F.I.C., F.C.S., Director of Agriculture, Straits Settlements and Federated Malay States. Government Printing Office, Johore Bahru. 1934.

cent. of the total population, while 285,000 persons, or 56.6 per cent. of the population are foreign born. As the great bulk of the population is engaged in agriculture, its increase serves as an index of agricultural development. The total population comprises 234,000 Malaysians, 215,000 Chinese, 51,000 Indians, 700 Europeans, and 4,300 others.

Of the immigrant population, the Indians are mainly engaged as estate labourers; of the remainder, both Chinese and Malaysians are largely small-holders; they are industrious and thrifty and they are, for the most part, fairly skilled agriculturists; they are, in consequence, an addition to the population peculiarly favourable to development.

As elsewhere in Malaya, cultivation is divided between estates owned by Europeans and Asiatic capitalists, and small holdings.

Estate* agriculture is mainly confined to two crops, *viz.*—rubber and oil palms, but there must also be included about 11,000 acres of pineapples grown on estate or semi-estate lines as a main crop; uncertain areas of tapioca and gambier are being grown in the same way.

It is computed that about 510,000 acres represent what may be definitely termed estate cultivation, of which 469,000 acres are under rubber and 27,000 acres under oil palms.

The nationality of ownership of estates in Johore has been estimated to be as follows:—European 278,000 acres, Chinese 16,000 acres, Japanese 54,000 acres, Indian 14,000 acres, Malay 3,000 acres, other Asiatic races 1,000 acres.

It is noteworthy that in Johore, coconuts—which elsewhere in Malaya constitute a not unimportant estate crop—are grown exclusively in small holdings.

The area of small holdings in Johore is roughly 600,000 acres. It is clear, therefore, that the welfare of the small-holder must have a very particular significance for the Johore administration in as much as the prosperity of the State is so largely bound up therein.

Agricultural Policy in Johore.

Between the years 1921 and 1930, the tendency in Johore was towards rapid agricultural expansion; with the advent of the depression there has been a change. The cessation of alienation of land for rubber planting has been accompanied by an increasing determination on the part of the Government to ensure that the agricultural land of the State, which constitutes its chief natural asset, should not be wastefully exploited; at the same time, vigorous efforts are being made to achieve an accurate and complete system of land records and to correct any omissions and errors which may have occurred in the preceding period. Concurrently with these efforts, the extension and improvement of the agricultural services require attention.

* An estate is defined as a planted area of not less than 100 acres.

The Agricultural Requirements of Johore.

In Johore, with its very large agricultural development and particularly its large peasant proprietary, there is obviously need for efficient agricultural services. Those responsible for the larger and more efficiently managed properties are in a position to make their wants known. In the case of the rubber industry these facilities already exist in the Rubber Research Institute, the officers of which are available for advice, visits and work on the spot whenever the need is indicated. In relation to other industries the position is somewhat different; the services of the research branch of the Department of Agriculture, S.S. and F.M.S., are to a certain extent available, but visits can only be paid by specialist scientific officers at the request of the State Government and on payment of the full salary and allowances of any officer so sent.

With the development of the pineapple industry and possibly the tapioca, gambier, and tuba industries, into main-crop cultivations, the need for specialist advice is certain to become increasingly felt. Obviously, both planters and Government should have access to readily available and efficient advice and guidance and planters should be encouraged to utilise freely all assistance which can be rendered.

In relation to peasant industries the needs are more complex. The peasantry is usually not only unable effectively to express its needs, but also unable to realise fully what its needs really are; consequently, it cannot take steps to fulfil them, alone and unaided. Unless, therefore, Government is prepared to assist peasants by providing sound and practical advice and help, it is impossible to expect rapid development.

Necessary preliminaries to this form of assistance are a study of conditions and research work correlated to the requirements of the population. An example of this is to be found in the work carried out in the past four years in the Federated Malay States and Straits Settlements in relation to the improvement of copra. Other subjects which require consideration are concerned with the control of plant diseases, the marketing of peasant produce, and the provision for systematic training in agriculture for the younger generation of peasant cultivators.

The problems affecting particular agricultural industries in Johore are dealt with in some detail. The following account epitomises some of the more salient points.

The Rubber Industry.

The requirements of the estate section of the industry are more or less adequately catered for at present by the Rubber Research Institute of Malaya. The inauguration of a trained staff of Asiatic Rubber Instructors, which has now been approved, will enable small-holders to obtain more readily the advantages of the expert advice of the Institute. When this service has been organised, numerous problems will require to be considered and a definite programme of work will require to be drawn up. Amongst these will be attention

to disease and demonstration of the proper methods of dealing with it, attention to improvements in the preparation of smoked and unsmoked sheet, attention to tapping systems and possibly assistance in marketing the product.

Coconuts.

The very large area of coconuts contained in small holdings represents no less than one-fourth of the total area under this crop in Malaya.

The general lay-out of the area does credit to the skill and industry of the owners. The regular planting, admirable systems of drainage and general appearance of the plantations is superior to the majority of native holdings elsewhere in Malaya. One is struck by the freedom from disease, and concludes that the owners have been quick to see the advantage of such measures of control as are recommended by the Department of Agriculture, for by repressive measures alone such a result could hardly have been attained.

The copra is in the hands of Chinese and sometimes Javanese buyers. It is of poor quality and made on somewhat primitive kilns.

The situation calls for improvements in the methods of copra manufacture and organised selling. This will necessitate careful watching and supervision, and assistance will almost certainly be required in marketing, as without informed work in this direction also, experience has shewn that much of the profit that can be realised may be lost. Attention is directed to the copra work already achieved by the Department of Agriculture. The extension of this work to Johore is suggested.

Oil Palms.

Johore now possesses the largest area under this crop in any one State, *viz.* 30,000 acres. It is contained on six estates. The largest property has already 10,000 acres planted, and reserves of a further 15,000 acres. There are three factories at present working, and a fourth will shortly be erected. One of these factories is the largest and most up-to-date of its kind in Malaya, if not in the world.

The industry is a new one, and like all new industries, presents many problems requiring solution, comprising both problems of agriculture and problems of manufacture, the latter process being more than ordinarily complicated.

For the solution of these problems, readily available scientific advice and assistance are requisite, and it is essential in the interests of the industry and of the State that owners who have embarked much capital in these undertakings, should be able to call in such assistance whenever required.

It is clear that the very large amount of work which has been done on these problems by the Department of Agriculture has directly benefitted the industry, and there are good grounds for Johore supporting this scientific work and taking full advantage of the existing facilities,

Pineapples.

The pineapple industry is of peculiar interest to Johore at present, both on account of its extent and nature, and also in view of the fact that it is undergoing a transition from that of a catch crop grown between young rubber to that of a main crop.

The Malayan industry is the second largest in the world; it has an assured market, and the crop can be grown under as favourable conditions as anywhere in the world. It is essential that the industry should be retained, but the present position is full of difficulty and danger. The industry is worked on the basis of supplying a demand for a cheap product. The period which has been put to its existence as a catch crop necessitates a sharp change in agricultural methods, and if it is to survive as a main crop, regular manuring and efficient cultivation must replace the formerly prevalent methods which were of little importance at a time when it was a question of planting as a catch crop between young rubber, but which can bring about the ruin of large tracts of land if the attempt is made to apply them to the cultivation of the fruit as a main crop.

Fortunately the needs of the situation have to an extent been foreseen and the establishment of the Pineapple Experiment Station in Singapore, to which Johore contributes one-third of the upkeep, has furnished the means of giving definite information as to the manurial requirements of the pineapple crop.

It is very desirable, by control of quality and regulation of supply, to endeavour to maintain a price which will allow a reasonable profit to producers. The legislation which has recently been passed in the Colony of the Straits Settlements and in Johore, should assist in this direction, while the work now being carried out in the Singapore Station on the experimental shipment of graded pines should also prove of value.

Concurrently, the improvement of working conditions and methods in factories and of market organisation needs attention.

The industry is handicapped by lack of attention to the quality of the produce, by destructive competition in selling, by old fashioned methods of manufacture, and in some cases, by unsatisfactory manufacturing conditions. It is, moreover, seriously threatened by the competition of other countries.

Factory conditions have much improved of late, but conditions under which the operations are conducted remain rather primitive, and the methods of canning and processing are still antiquated and out of date.

By systematic research, propaganda and organisation, the industry can be modernised and stabilised, but for this, considerable efforts and adequate resources are necessary.

Tapioca.

The position in relation to tapioca is not dissimilar to that of the pineapple industry. In Johore, tapioca has been extensively cultivated as a catch crop between young rubber, and an industry has grown up, the existence of which is threatened owing to the need for its conversion from a catch crop to a main crop basis,

Like many other products, Malayan tapioca does not attain the highest standard of quality and cannot compete in this respect with the Javanese product; it seems very probable that if the product could be brought up to the level of the Javanese, it could displace the latter in the markets of the United Kingdom.

In Malaya the crop is largely confined to Johore, which is by far the largest producer. If, as in the case of pineapples, it can be successfully converted from a catch crop to a main crop basis, a valuable industry will have been firmly established in the State; if not, a useful asset is likely to become lost.

The crop makes appreciable demands on the soil, but not more so than many others, and the problem of its continuous cultivation is, just as with pineapples, that of devising an economic system of manuring and cultivation which will enable it to be cultivated continuously, or in rotation with other crops on the same land.

Sago.

This product can conveniently be mentioned at this point and although it can hardly be dignified with the name "crop" it is a not unimportant item of export from Johore. Nothing has so far been done towards investigating the problem of its possible evolution into a regular crop.

Gambier.

Gambier is a third example of a crop which has been grown fairly extensively in Johore as a catch crop between young rubber, and which is now faced with the alternatives of either conversion to a main crop or abandonment as an industry.

Information on this crop is available, but should be supplemented with further work in Johore itself.

Tuba Root.

This is a crop which gives promise of capacity for not inconsiderable extension. It is cultivated in Johore entirely as a catch crop, but the possibilities of its development as a main crop should not be overlooked.

The product is used as an insecticide. Work on varieties and their insecticidal properties, on cultivation and manuring the crop are under investigation. As a guide to agricultural policy, this information should prove of value.

Fruit other than Pineapples.

It is estimated that there are approximately 17,000 acres of fruit other than pineapples under cultivation in Johore, of which approximately 8,000 acres are under bananas and 9,000 acres under other kinds.

The past and present work of the Department of Agriculture on fruits is recounted, and the importance of organising the marketing of fruit in Johore is stressed,

Coffee.

The area under coffee in Johore is the largest of any administrative unit in the Peninsula. Coffee is a crop which responds to cultivation and treatment; it is liable to certain diseases, and there are a considerable number of varieties with different yielding properties, different resistance to disease, different size of bean and different flavour.

Experiments on cultivation, disease, and preparation of coffee are in progress at Serdang, but it is desirable that this work should be supplemented by investigations in Johore where soil and climate factors are different from those at Serdang.

Other Minor Crops.

These include a number of products such as tobacco, patchouli and other essential oil bearing crops, pepper, sيره, ginger, chillies, kapok, groundnuts and vegetables.

On tobacco quite a considerable amount of work is being done by the S.S. and F.M.S. Department, but the position is complicated by fiscal questions. On the remainder, with the exception of patchouli, a certain small amount of research has been carried out and is in progress, but limitation of resources and a heavy programme of work in other directions at present limit its scope. If additional facilities for experimental work are provided in Johore, useful work thereon could no doubt be done.

Rice.

As elsewhere in Malaya, the question of rice-growing has lately been much discussed in Johore, while economic conditions have led to considerable extension of rice cultivation.

In 1930 the area under rice in Johore was 13,000 acres of which 6,210 acres were under wet padi; in 1932-33 it was 25,060 acres of which 15,800 acres were under wet padi.

The position in relation to rice-growing in Johore differs from that in most other States in that there is no history or tradition of padi planting. Consequently the backward condition of the padi industry is not surprising. In other parts of Malaya with a much longer history of development, padi-growing arose from the needs of the population to produce food.

It is admitted now that it is desirable that rice cultivation should be extended and the yields from existing areas improved. The opening up of entirely new areas should only be undertaken with circumspection, and when the assurance exists that the population required to take them up is available; in addition, adequate facilities must exist for other forms of cultivation to supplement the income of the rice grower.

It must further be realised that in Johore, the standard of rice cultivation is lower than elsewhere.

A considerable addition to the return of rice from existing areas in Johore can be made if cultivation practice can be improved. The Johore Government would be well advised to study carefully means of improving and extending cultivation in areas where it already exists, but should be chary of attempting to open up large new areas immediately.

A decision as to the fitness of land for padi cultivation demands examination of topography and soil. Certain reconnaissances have already been made and a considerable number of soil samples examined and reported on for the Johore Government by the F.M.S. and S.S. Department of Agriculture. These reconnaissances should be continued as opportunity offers and the results kept for future guidance.

In view of the importance of irrigation, the assistance of the Irrigation Department would be of value to Johore.

So far as improvements in cultivation are concerned, these include better tillage, planting, and the use of improved strains of seed, but, to be able to advise on these subjects, experiments and demonstrations are necessary.

Test plots already laid down in Johore in conjunction with native cultivators have produced negative results.

It is suggested that the best plan is for Johore to follow the F.M.S. example and to establish a small number of test stations where accurate work may be performed and which will also serve as demonstration centres.

The suitability of padi varieties to particular environments is sometimes very restricted. This suitability can only be ascertained by experiment, and to be of value experiments must be conducted on standard lines in different districts.

In relation to research on rice the Department of Agriculture, S.S. and F.M.S., carries out a large programme of work affecting practically all aspects of the rice industry. As a result, many improved high-yielding varieties of rice have been evolved, tested out, and brought into general cultivation; manurial and cultural questions have been investigated as have also many pests and diseases.

Recommendations.

Johore is equally interested in the maintenance, development and well-being of industries other than rubber if not from the point of view of actual area cultivated, at least from the need for maintaining and expanding the many other kinds of agricultural activity that exist.

As a contribution to this, the existing provision of \$3,000 per annum to the Department of Agriculture, Straits Settlements and Federated Malay States, is inadequate. The obvious solution lies in making provision commensurate with the value of the services rendered, on the undertaking that if such a contribution is made, the research service will be freely available and adequate staff and facilities will be maintained to meet fully the requirements of the State.

Reviews.

Coleopterous Pests of Stored Derris in Malaya.

By N. C. E. Miller, Special Bulletin, Scientific Series No. 14, Department of Agriculture, Straits Settlements and Federated Malay States.
1934. Price 50 cents (Straits Settlements).

Derris spp. or tuba root, is an insecticide which is commanding increasing attention in many parts of the world and especially in the United Kingdom and in America. Knowledge of its toxic properties and efficiency against various classes of insects is accumulating rapidly. Malaya and the Netherlands Indies are the countries of production of this product and on this, the producer's side, considerable investigation on methods of cultivation, valuable species, and preparation for market, has been carried out. One of the most serious obstacles against the wider use of derris in the past has been to find a convenient method of packing the raw product and the protection of the derris itself from the ravages of insect pests.

It may seem somewhat paradoxical that an insecticide should itself be subject to insect attacks.

The author gives a full account of the life histories of a number of coleopterous insects usually associated with such damage to derris, which is followed by recommendations which, if adopted, should obviate damage of this nature.

D. H. G.

Annual Reports of the Department of Agriculture, Straits Settlements and Federated Malay States.

In the compass of the Annual Report of the Director of Agriculture, little more is possible than an outline of the work of the Branches of the Department. The publication of the individual reports, therefore, has been found to be of value to investigators not only in this country but elsewhere, and such publications should be found useful for reference also by many non-officials in this country. Permanent records such as this offer an opportunity for the research worker in one country to study the methods adopted elsewhere and to seek therefrom a possible application to the immediate problems with which he is confronted.

Two recent Special Bulletins Nos. 19 and 20 of the General Series, of the Department of Agriculture, Straits Settlements and Federated Malay States, record the progress of work in that Department of the research, economic, and agricultural education branches, and of the various officers of the Field Branch, during the year 1933.

D. H. G.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

The Weather.

In Kedah, the north western areas of Perak, Malacca and Singapore rainfall was above average; in other centres precipitation was below normal. Heavy rains towards the end of the month caused minor flooding in the low-lying areas along the banks of the Jelai and Lipis rivers in Pahang.

Remarks on Crops.

Rubber.—Compared with the previous month a general decline in price was reported from all centres.

Heavy rains reduced production by curtailing tapping operations. The weather was also responsible for a recrudescence of mouldy rot disease in all areas previously infected. A satisfactory measure of voluntary control is reported, and the Department distribution of approved fungicides at low cost is meeting an increased volume of support.

The general improvement in small holding upkeep which has become apparent since the introduction of restriction has been generally maintained. Extravagant systems of excision continue to be reported from several centres.

Further improvement in small holding manufacture, as a result of instruction work carried out by the Small Holdings Advisory Service, is recorded.

Rice.—The price for padi at the Government Rice Mill, Bagan Serai, remained unchanged, but a slight decline occurred in Kedah towards the end of the month.

In Pahang South some early harvesting is in hand in the Temerloh District, while flowering has commenced in parts of the Dong, Penjom and Segamukims, and in the coastal areas. A poor harvest is being reaped in the Batu Pahat District of Johore.

In Kedah and the large rice-producing District of Krian, planting has been completed, and where damage was sustained as a result of flooding in early September, the plants have made an excellent recovery. Water supplies are adequate and the crop presents an excellent appearance.

In other centres, with the exception of Kelantan and the southern areas of Province Wellesley, planting is completed and favourable crop progress reported.

Coconuts and Copra.—There was a slight appreciation during the month of the Penang price for f.m.s. quality copra, the range being \$3.07 to \$3.15 per picul.

Following the padi-planting break, small holding production in the Krian District recommenced. Some sixty-four piculs shipped to Penang from one improved kiln realised \$3.10 per picul.

Keen competition among dealers in several important producing centres has resulted in a marked rise in nut prices, the highest recorded being \$14 per thousand. At this price copra production is not economic.

Improved small holding kilns continue to produce good quality copra in the Muar District of Johore. Further kilns of a good type will shortly be in production on the western coast of that State.

Fruit.—In the Jelebu District of Negri Sembilan, where a considerable export of bananas is made to markets in Singapore, Malacca, Kuala Lumpur and Seremban, durians, mangosteens, rambutans, langsats and mata kuching are being harvested. A heavy crop of durians is reported from the Ulu Lipis valley of Pahang, while machang, mempelan, chiku, mangosteen, durian, pulasan and rambutan are fruiting in the Klang District of Selangor.

Pineapples.—Harvesting commenced in the Kulai and Kota Tinggi areas in Johore, but supplies were not sufficient for factory requirements; one plant only was in use and it was operating on part-time.

Fruiting commenced in many centres in Singapore, and factory prices declined in view of forthcoming supplies. The season has also opened in the Klang and Kuala Langat Districts of Selangor, the local factory taking a portion of the crop, the balance being exported to Singapore.

Tuba.—A brisk demand exists in Singapore for good quality dried root; numerous enquiries have been made for information and planting material.

Tapioca.—Interest in this crop has been maintained in Kedah where a further area of 390 acres has been planted.

Carp Rearing.

This industry is making appreciable progress among Malays in Pahang. Recently imported fry are making very satisfactory progress at Chat, and the stock at Benta have now reached an average weight of 2½ kati each. Further ponds are in the course of construction in the mukim of Semantan.

Poultry.

Outbreaks of disease, which have so far not being diagnosed, occurred at Sitiawan in Lower Perak; Cheras and Kerling in Selangor; Ketapang near Pekan, Pahang; and in the Kukub District of Johore. Roup was present on the Sungei Udang Experiment Station, Malacca. In no case was a heavy mortality experienced.

Kampong and Home Garden Competition.

Preliminary judging has commenced in Pahang, where many gardens are reported to be of a very high standard of excellence. Enthusiasm in connexion

with these competitions has not been maintained in the Klang District of Selangor where entries are twenty-seven as compared with ninety-five for last year.

Agricultural Stations.

Good progress continues to be made on all Stations. Permanent crops such as tea, coffee and fruit are becoming established, and appreciable quantities of planting material of minor crops and food stuffs have been raised to meet an increasing demand. Considerable attention has recently been given to poultry and most Stations are now supporting flocks of pure-bred birds. Native agriculturists are evincing much interest in these demonstration centres and are increasingly appreciating the services they are intended to supply.

Padi Stations and Test Plots.

With the exception of Sungei Tontong in the Dindings, planting is now complete. Flowering has commenced at Dong and Lipis Plots in Pahang, and Jelebu in Negri Sembilan. Heavy winds have caused some lodging in Plots situated in the coastal areas of Pahang.

Two early Hongkong varieties of rice proved quite unsuitable for local conditions in Kedah. They produced grass-like foliage and very small ears; they were eventually discarded and replaced by the variety Mayang Sebatil. Hongkong varieties are also in flower at Pulau Gadong Experiment Station, Malacca, but are not comparable even with the poorest local types.

At Titi Serong the crop made a good recovery from the flood damage experienced early in September. Weeding is now in hand, pest damage is negligible, and the crop presents an attractive appearance.

Heavy rains at the beginning of the month caused much damage by flooding on the newly transplanted area recently opened up for mechanical cultivation at Pulau Gadong.

Reports on conditions generally from all experimental centres are satisfactory, and prospects for at least an average harvest are good.

DEPARTMENTAL NOTES.

Rural Broadcasting

The scheme formulated by the Propaganda and Marketing Committee for the introduction of broadcasting in the Malay language to village communities is under consideration by a sub-committee appointed by that body.

With the assistance of officers of the Posts and Telegraphs Department, tests of reception have been carried out at various centres in Selangor. The results were reasonably satisfactory in most instances.

The next step is to test suitable apparatus by means of a short programme at a particular centre, the object being not only to ascertain the suitability of the receiving set, but also the number of people who can hear at one time, as well as to select announcers.

It is hoped, if this short trial is satisfactory, to introduce an experimental weekly broadcast programme of varied items over a period of two months, commencing before the end of the present year.

The Propaganda and Marketing Committee, who have this matter in hand, is composed of officers of the Co-operative, Agriculture and Veterinary Departments and of the Rubber Research Institute.

Meeting of the Agricultural Advisory Committee.

A meeting of the Agricultural Advisory Committee was held at the Department of Agriculture, Kuala Lumpur, on 18th October 1934, when the progress of the work of the Department for the past few months was reviewed and several important questions of policy discussed.

Tours of the Director of Agriculture.

The Acting Director of Agriculture and the Acting Chief Field Officer visited Sabak Bernam and the new padi area of Panchang Bedina in that sub-District on October 13th, 14th and 15th. The improved copra kiln owned and operated by a group of Malays at Sabak Bernam was inspected and matters relating to the purchase of nuts and sale of copra were discussed.

The Panchang Bedina and Haji Durani Padi Test Stations were inspected. Notes were made on the present conditions of the new padi area and on various points in connexion with future requirements.

The Acting Director of Agriculture paid a visit of inspection on October 15th to the Dong and Kuala Lipis Padi Test Station in Pahang and to the Agricultural Station, Kuala Lipis.

Visit to Labuan and Brunei.

In accordance with arrangements at present in force for the establishment of agricultural services in Labuan and Brunei, the Agricultural Field Officer, Singapore, paid a visit to these territories between 22nd September and 23rd October, 1934.

Leave.

Mr. J. Lambourne, Assistant Agriculturist, has been granted 9 month full-pay leave from 12th October 1934 to 11th July 1935 inclusive.

Mr. T. D. Marsh, Assistant Agriculturist, returned from leave on 25th October, 1934.

DISTRICT AGRICULTURAL SHOW.**Mersing (Johore) Agricultural and Industry Exhibition.**

A two-day Agricultural and Industry Exhibition was held at Mersing, Johore, on 27th and 28th September 1934. In opening the Exhibition, the Dato Mentri Besar, Johore, stressed the importance of agriculture and village industries to small-holders in that part of the State.

Sections were provided for cereals, vegetables, fruits and village industries. The exhibits in the agricultural sections were not numerous, due in the case of cereals and fruits, to the unsuitability of the dates for holding the Show. The Show was originally fixed for June, but was postponed owing to unforeseen circumstances.

The Department of Agriculture staged an exhibit, and in the evenings delivered lantern lectures on agricultural subjects of particular interest to the cultivators in this District.

Statistical.

MARKET PRICES.

October 1934

Rubber.—The price of rubber continued to weaken during October and, opening at 24½ cents per lb. for spot loose in Singapore, the market closed at 21½ cents per lb. The average price for the month in Singapore was 22.76 cents per lb. for Smoked Sheet equal to London Standard, as compared with 25.09 in September. The average price for October in London was 6.75 pence per lb. and in New York 13.78 cents gold per lb. as compared with 7.41 pence and 15.26 cents gold respectively in September.

Weekly prices paid during October for small-holders' rubber at three centres are shewn in the following table.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, October, 1934.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.			
	4	11	18	25	3	17	24	31	3	17	24	31
Smoked sheet			26.50			26.79	26.09	25.00	26.38		24.70	24.22
Unsmoked sheet	23.21	24.07	24.06	24.09	24.74	23.15	21.99	22.00		23.05	23.28	22.32
Scrap	13.68			14.00		15.00					15.53	

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

No purchases at Batu Pahat and Kuala Kangsar on 10th October.

Palm Oil.—The following prices for the local commodity, c.i.f. landed weight, Liverpool, are now available:

13th September, 1934	£12. 0. 0
20th " "	12.10. 0
27th " "	13. 0. 0
4th October, "	13. 0. 0
11th " "	13. 0. 0
18th " "	13. 0. 0
26th " "	13. 0. 0

Palm Kernels were quoted on the 26th October at £6.17.6 per ton c.i.f. Continent.

Copra.—The feature of the Singapore market was the improvement in the price of the mixed quality which rose from an opening price of \$2.35 per picul to \$2.70, and closed at \$2.60. The sun-dried grade opened at \$2.95 per picul, rose to \$3.20 and closed at \$2.90, averaging \$3.01 as compared with \$2.93 in September. The average price for the mixed quality was \$2.52 as against \$2.28 in September.

Copra cake weakened slightly, averaging \$1.65 per picul as compared with \$1.77 in September.

Rice.—The average wholesale prices of rice per picul in Singapore during October were as follows:—Siam No. 2 (ordinary) \$3.39, Rangoon No. 1 \$3.30, Saigon No. 1 (long grain) \$3.30, as compared with \$3.13, \$3.16 and \$3.17 in August. Corresponding prices in September, 1933 were \$3.53, \$2.88 and \$3.22 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in September were: Singapore 26, Penang 25, Malacca 26, as compared with 23, 24 and 23 respectively in August.

The average declared trade value of imports of rice in September was \$3.38 per picul as compared with \$3.03 in August and \$2.85 in July.

Padi.—The price paid for padi at the Government Rice Mill, Bagan Serai, continued at \$1.50 per picul; a privately owned mill paid \$1.40 per picul. Prices per gantang ranged from 5 to 13 cents in various parts of the country.

Tea.—Tengah Rata (Cameron Highlands) tea was quoted in London during September at 11d. per lb. and Bigia (Kedah) tea was quoted at an average of 10.75d. per lb.

Average London prices per lb. for tea consignments from other countries were as follows:—Ceylon 1s.0.32d., Java 9.44d., Indian Northern 1s.0.85d., Indian Southern 11.05d., Sumatra 9.03d. The decline in prices continued during the month until the last week when a slight improvement was evident.

Tuba Root (Derris).—Transactions in this commodity during October were on a limited scale. The Singapore average price for roots sold on rotenone content continued unchanged at \$40 per picul, but the market for roots sold on a basis of ether extract weakened still further, the average price for the month being \$28 per picul as compared with \$30 in September.

Coffee.—Prices in Singapore of coffee weakened during October. Sourabaya coffee opened at \$19 to \$20 per picul falling to \$18 to \$19 at the close; Palembang coffee opened at \$13 per picul and fell to \$12, an average for the month of \$12.44 as compared with \$13.19 in September.

Local prices for coffee beans ranged from \$14 to \$32 per picul.

Arccanuts.—October average prices per picul in Singapore were as follows :—Splits \$5.31 to \$6.06, Sliced \$10 to \$12.44, Red Whole \$5.69 to \$6.25, Kelantan \$5.69 to \$5.94, the price in each range depending upon quality. No prices were quoted for Bila Whole and Sourabaya Whole.

The average prices per picul quoted by the Singapore Chamber of Commerce were :—Best \$5.48, Medium \$5.05, Mixed \$4.70.

Gambier.—Singapore prices continued their upward trend during October and closed at \$6.75 per picul for Block, and \$9.50 per picul for No. 1 Cube. The respective average prices for the month were \$5.81 and \$8.94 as compared with \$4.40 and \$7.70 in September.

Pineapples.—The Singapore market remained at a standstill, prices being nominal with no contracts passing. Prices quoted per case were :—Cubes \$3.05, Sliced Flat \$3, Sliced Tall \$3.25. The average prices for September were \$3.11, \$3.05 and \$3.25 respectively.

In Johore, prices for fresh fruit were: No. 1 quality \$2 to \$2.40 per 100, No. 2 quality \$1.80 to \$2 per 100, No. 3 quality \$1.20 to \$1.60 per 100. Prices in Singapore at factories were \$2.20 per 100 for large fruit and \$1.60 per 100 for small fruit. Prices in Selangor ranged from 50 cents to \$3 per 100 according to quality and \$3 to \$10 per 100 for Sarawak pines.

Tapioca.—The Singapore market remained unchanged during October with the exception of Flake Fair which weakened to \$3.40 in the second half of the month.

Average prices per picul were :—Flake Fair \$3.45, Seed Pearl \$5.50, Pearl Medium \$5.85, as compared with \$3.65, \$5.70 and \$5.85 respectively in September.

Sago.—Singapore prices of Pearl, Small Fair, remained unchanged at \$3.90 per picul throughout the month, but Flour, Sarawak Fair, improved with increased demand averaging \$2.03 per picul. The September average prices were \$3.94 and \$1.92½ respectively.

Mace.—Although very little business was passing Singapore prices remained high and unchanged throughout the month owing to stocks being light. Prices were: Siouw \$90, Amboina \$60 per picul as compared with average prices of \$90 and \$57 respectively in September.

Nutmegs.—There was good enquiry for nutmegs during October and prices improved accordingly. Average prices were \$25 per picul for 110's and \$26 per picul for 80's an increase of \$1 per picul in each case as compared with September.

Pepper.—The market was again considerably affected by speculative buying in London which forced up prices, Singapore White closing at \$61 per picul and Muntok White \$63 per picul. Average prices per picul in Singapore for the month were:—Singapore Black \$18.88, Singapore White \$55.50, Muntok White \$57.38, as compared with \$15.50, \$40.30 and \$41.70 respectively.

Cloves.—Singapore prices continued nominal at Zanzibar \$35 and Amboina \$45 per picul.

Tobacco.—Prices of sun-dried leaves ranged from \$6 to 48 per picul according to quality. Java tobacco was quoted in Perak at \$60 to \$70 per picul and in Johore at \$40 to 80 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

September 1934.

Malaya.—Imports of foreign rice into Malaya during September were 67,441 tons and exports 17,096 tons, net imports accordingly being 50,345 tons. For the period January to September, 1934, net imports were 352,586 tons, an increase of 11.6 per cent.†

Of the imports during September, 50 per cent. were consigned to Singapore, 15 per cent. to Penang, 6 per cent. to Malacca, 20 per cent. to the Federated Malay States and 9 per cent. to the Unfederated Malay States. Of the total, 69 per cent. came from Siam, 28 per cent. from Burma, 2 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during the month under review, 67 per cent. were shipped to the Netherland Indies and 33 per cent. to other countries. The various kinds of rice exported were: Siam 11,081 tons (64.8 per cent.), Burma 3,760 tons (22 per cent.), French Indo-China 354 tons (2 per cent.), India 1,789 tons (10.5 per cent.), local production 112 tons (0.7 per cent.).

India and Burma.—Foreign exports for the period January to August, 1934, totalled 1,121,000 tons, as compared with 1,465,000 tons in 1933, a decrease of 23.5 per cent.

Total exports of rice and bran from Burma for the period 1st January to 1st September, 1934, amounted to 3,085,275 metric tons as compared with 2,591,490 metric tons in 1933, an increase of 19 per cent.

According to the *Indian Trade Journal*, 4th October, 1934, the exportable surplus from Burma from the new crop was estimated at 3,200,000 tons (all kinds of rice and rice products), a decrease of 250,000 tons or 7.2 per cent. as compared with the forecast of the previous year.

The first forecast of the crop in Burma for the season 1934-35, states that the area likely to mature is estimated at 12,496,700 acres, a decrease of 78,600 acres or 0.6 per cent. as compared with the corresponding estimate for the season 1933-34, and an increase of 32,400 acres or 0.3 per cent. as compared with the final figures for that season. A good harvest is indicated for the Province as a whole if the October rains prove favourable.

Siam.—August exports of rice from Bangkok were 191,246 tons, giving a total of 1,198,810 tons for the period January to August as compared with 1,104,135 tons in 1933.

Japan.—The 1934 rice crop of Japan Proper has been estimated at 7,998,146 tons, which is 19.5 per cent. less than the actual crop of 1933 and 8.9 per cent. less than the average of the previous five years.

*Abridged from the Rice Summary for September, 1934, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1933.

The area under rice in Formosa for the first crop of 1934 was 712,605 acres, an increase of 5,034 acres or 0.7 per cent. as compared with the corresponding crop of 1933. Production amounted to 632,658 tons, which is 80,265 tons or 14.5 per cent. more than was harvested during the same season in 1933.

French Indo-China.—Entries of padi into Cholon, 1st January to 30th September, 1934, totalled 1,246,700 metric tons, an increase of 37 per cent. as compared with 910,007 metric tons in 1933.

Exports of rice for the same period this year were 1,141,821 metric tons, an increase of 10.3 per cent. as compared with 1,035,464 metric tons in 1933.

The report on the Saigon Rice Market for September 1934 indicates that there was an almost entire lack of enquires from abroad and prices accordingly weakened, the market closing on a falling tendency.

Netherlands Indies.—Imports of rice for the period January to July, 1934, (*Economic Bulletin* 1st October, 1934) totalled 107,404 metric tons, a decrease of 57.9 per cent. as compared with imports of 255,734 metric tons in 1933.

The area under rice in Java and Madura harvested during this period was 7,595,250 acres, as compared with 7,713,810 acres in 1933, a decrease of 1.5 per cent.

Ceylon.—For the period January to September, 1934, imports totalled 359,577 tons, an increase of 10.9 per cent. as compared with 324,331 tons in 1933. Of the 1934 imports 14.5 per cent. were from British India, 62.9 per cent. from Burma and 22.6 per cent. from other countries.

Europe and America.—Shipments to Europe from the East were 950,032 tons for the period 1st January to 20th September 1934, as compared with 1,028,482 tons in 1933, a decrease of 7.6 per cent.

Of the 1934 shipments, 39 per cent. were from Burma, 5 per cent. from Japan, 45 per cent. from Saigon, 9 per cent. from Siam and 2 per cent. from Bengal. The corresponding percentages for 1933 were 51, 2, 39, 7 and 1 respectively.

Shipments to the Levant from the East for the period 1st January to 11th August, 1934, were 22,899 tons, an increase of 8.6 per cent. as compared with 21,087 tons in 1933.

Shipments to the West Indies and America for the period 1st January to 22nd August, 1934, were 138,626 tons, an increase of 15.8 per cent. as compared with 119,703 tons in 1933.

MALAYAN AGRICULTURAL EXPORTS, SEPTEMBER, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-Sept. 1933.	Jan.-Sept. 1934.	September 1933.	September 1934.
Arecanuts ...	20,756	14,930	14,569	1,417	1,056
Coconuts, fresh ...	100,609†	78,454	72,366	10,388	7,270
Coconut oil ...	17,568	13,048	18,348	1,289	2,081
Copra ...	110,543	73,037	66,676	12,492	6,151
Gambier, all kinds ...	2,560	1,802	1,598	165	151
Oil cakes ...	9,992	7,616	8,255	778	945
Palm kernels ...	1,983	1,433	2,077	285	191
Palm oil ...	12,101	7,118	10,239	988	1,515
Pineapples canned ...	59,582	49,718	56,837	2,873	2,973
Rubber ...	459,836¶	331,796¶	351,881¶	39,897¶	42,097¶
Sago,—flour ...	7,648	2,605	5,560	245*	814
„ —pearl ...	2,646	1,644	3,551	214	436
„ —raw ...	4,420*	3,070*	4,736*	421*	615*
Tapioca,—flake ...	9,881	7,950	4,939	711	323
„ —flour ...	702*	195*	1,476*	69*	160*
„ —pearl ...	17,297	12,932	12,077	1,324	1,349
Tuba root ...	569½	343½	422	30	40½

† hundreds in number.

* net imports.

¶ production.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS
3rd QUARTER, 1934.

(As declared by Estates)

	Palm Oil		Palm Kernels	
	F. M. S.	Johore	F. M. S.	Johore
July	1,111.4	586	162.1	118.0
August	1,486.7	479	211.1	75.5
September	1,467.6	411	206.2	61.3
Total	4,065.7	1,476	579.4	258.4

MALAYA RUBBER STATISTICS

ACREAGES OF TAPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 30TH SEPTEMBER, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (d) (2)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)		AREA OF TAPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5) (9)	Percentage of (9) to (2) (10)	
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)			
STRAITS SETTLEMENTS :—										
Province Wellesley	44,285	1,129	2.5	8,576	19.4	570	1.3	9,705	21.9	
Dindings	7,368	112	1.5	844	11.5	195	2.6	956	13.0	
Malacca	121,152	384	0.3	16,785	13.8	3,123	2.6	17,369	14.3	
Penang Island	1,366	385	13.5	424	31.0	201	14.7	609	44.5	
Singapore Island	28,842	3,910	13.5	4,319	15.0	523	1.8	8,229	28.5	
Total S.S.	203,013	5,920	2.9	30,948	15.2	4,612	2.3	36,868	18.1	
FEDERATED MALAY STATES :—										
Perak	253,227	3,667	1.4	37,101	14.7	13,989	5.5	40,768	16.1	
Selangor	310,003	4,291	1.4	43,342	14.0	12,369	4.0	47,633	15.4	
Negeri Sembilan	233,592	4,979	2.1	34,466	14.8	18,468	7.9	39,445	16.9	
Pulhag	46,712	4,449	9.5	13,966	29.9	9,400	20.1	18,415	39.4	
Total F.M.S.	843,534	17,386	2.0	128,875	15.3	54,226	6.4	146,261	17.3	
UNFEDERATED MALAY STATES :—										
Ipohore	365,400	10,324	2.8	25,743	7.1	22,179	6.1	39,067	9.9	
Kedah (b)	126,388	1,632	1.3	28,816	22.8	19,550	15.4	30,448	24.1	
Kelantan	25,793	8,471	32.8	129	0.5	5,418	21.0	8,600	33.3	
Tringganu (b)	4,543	Nil	Nil	98	2.2	98	2.2	98	2.2	
Perlis (c)	1,181	Nil	Nil	266	22.5	266	22.5	266	22.5	
Total U.M.S.	523,505	20,427	3.9	55,052	10.5	47,511	9.1	75,479	14.4	
Total MALAYA	1,570,052	43,733	2.8	214,875	13.7	106,349	6.8	258,008	16.5	

Notes :—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping land.

(b) Registered Companies only.

(c) Rested quarterly.

(d) Figures are as reported by estate managers.

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX, MALAYA RUBBER STATISTICS TABLE I
FOR THE MONTH OF SEPTEMBER, 1934, IN DRY TONS.

[illegible]

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

CLASS OF RUBBER		Federated Malay States	Singapore	Penang	Malacca	Province of Welles and Pichay	Malacca
DRY RUBBER		11,569	6,864	9,729	4,385	1,918	338
WET RUBBER		1,620	3,506	3,006	413	1,163	340
TOTAL		13,189	10,370	12,735	4,798	3,081	684

TABLE III
FOREIGN EXPORTS

PORTS	For month to Sept. 1934	January
Singapore	39,020	348.47
Penang	...	114,023
Port Swettenham	...	51,484
Malacca	...	5,347
MALAYA	...	61,051
		519,901

TABLE IV
DOMESTIC EXPORTS

AREA	For month	January to Sept. 1934
Malay States ..	33,737	315,373
Strait Settlements	4,105	
Malaya ..	37,842	315,373

[illegible]

Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

1. The production of less than 100 acres is estimated from the formula: $\text{Production} + \text{Imports} + \text{Stocks at beginning of month} = \text{Stocks at end of month}$

2. The production of estates of less than 100 acres is estimated from the formula: $\text{Production} + \text{Imports} + \text{Stocks at beginning of month} = \text{Stocks at end of month}$

Exports + Stocks at end of month, + Consumption, *i.e.*, Column {9} = Columns {15} + {16} + {19} + {20} + {21} + {22} + {4} - {5} - {6} - {7} - {11} - {12}. For the Straits Settlements, Column {9}: figures for Singapore and Penang Islands represent sales or exports as

[3]-[6]-[7]-[11]-[12]. For the Strategic Development Forum [3], shown by cess paid and for the mainland represent as previously purchases by dealers from local estates of less than 100 acres, reduced by 15 %

to terms of dry rubber.

Dealers' stocks in the Federated Malay States are reduced to dry weights as reported by the dealers themselves, scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.

Domestic exports are reported by the Customs Authorities for the Malay States and by the Registrars of Imports and Exports for Province Wellesley, Malacca, Dindings Labuan and Brunei. For Singapore and Penang Island domestic exports are represented by sales or exports of rubber as

shown by cases paid
by the Registrar-General of Statistics, S.S. and F.M.S. at Singapore on 28 October.

METEOROLOGICAL SUMMARY, MALAYA, SEPTEMBER, 1934.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT							EARTH TEMPERATURE		RAINFALL					BRIGHT SUNSHINE.				
	Means of			Absolute Extremes				At 1 foot	At 4 feet	Total.	Most in a day.	Number of days.				Total.	Daily Mean.	Per cent.	
	A.	B.	Min.	Max.	Mean of day and night.	Highest.	Lowest.					Max.	Highest.	Precipitation, .01 in or more.	Thunderstorm.				Fog morning obs.
								°F	°F	°F	°F					°F	°F	°F	
Railway Hill, Kuala Lumpur, Selangor	90.0	71.4	80.7	94	69	83	74	83.7	84.4	7.12	180.9	3.22	18	12	3	1	144.75	4.83	40
Bukit Jeram, Selangor	87.7	72.2	79.9	91	69	83	75	82.7	84.4	5.47	138.9	2.10	15	10	3	1	154.35	5.15	43
Sitiawan, Perak	88.3	72.1	80.2	92	71	79	74	83.0	84.7	7.91	200.9	2.93	14	12	1		135.15	4.57	37
Temerloh, Pahang	89.7	72.4	81.1	92	70	84	74	84.7	85.9	6.21	157.7	2.56	15	13	1	12	166.45	5.55	46
Kuala Lipis, Pahang	88.0	71.2	79.6	90	69	83	74	83.4	84.4	4.54	115.3	1.03	14	11	1	25	144.10	4.80	40
Kuala Pahang, Pahang	87.1	73.5	80.3	90	72	84	76	85.1	86.2	7.87	199.9	1.50	21	19	5		217.45	7.25	60
Kallang Aerodrome, Spore	86.6	76.3	81.5	90	72	82	79	81.9	82.9	4.57	116.1	1.39	9	7	2	3	177.05	5.90	49
Butterworth, Province Wellesley	85.9	73.9	79.9	89	71	76	76	82.1	84.1	21.73	551.9	6.77	18	14	2	1	136.80	4.56	38
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Bukit Lalang, Mersing, Johore	87.3	71.7	79.5	90	68	81	75	80.8	81.3	6.92	175.8	1.06	22	19	3	4	177.35	5.91	49
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The Director of Agriculture invites those interested in agriculture to visit the School of Agriculture, Serdang, the Experiment or Agricultural Stations on which miscellaneous crops are cultivated and the Stations and Plots devoted to experiments in padi growing.

Intending visitors to the School of Agriculture should communicate with the Vice Principal, School of Agriculture, Serdang, Selangor.

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Other Stations and Plots, together with the addresses of Officers to whom enquiries should be sent, are listed below:

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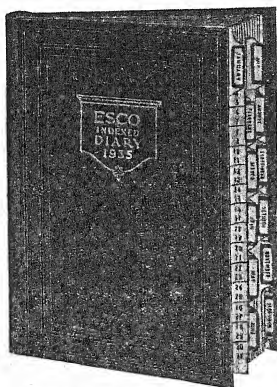
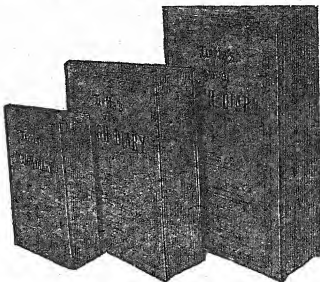
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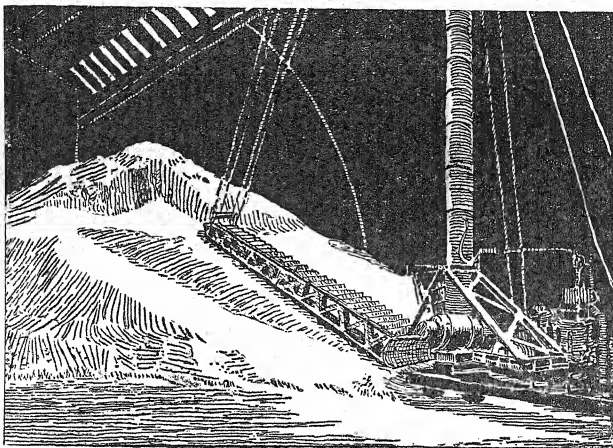


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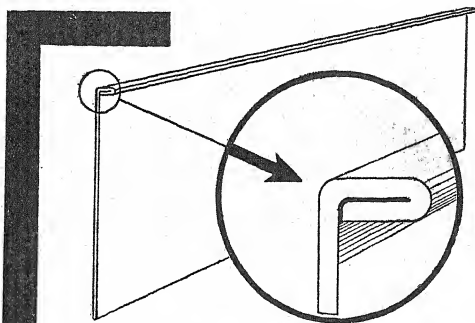
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THE Malayan Agricultural Journal.

DECEMBER, 1934.

EDITORIAL.

Malayan Rice Production.

With the conclusion of the 1933-34 season for padi production in Malaya, the time is ripe for an annual review of the progress of the work performed at the numerous rice experiment stations throughout Malaya.

Those who study at all closely the articles, which appear in the pages of this Journal from time to time, on the conduct, progress and achievements of the rice work of the Department, will realise that there is to-day close co-ordination in the work throughout the country. The method which now obtains, of conducting similar experiments in many centres, enables more reliable conclusions to be drawn therefrom, and the contrast of results obtained under the differing local conditions, as well as the similarities which become evident in spite of varying local factors, frequently emphasise points which under other conditions might be less evident, or - in fact - overlooked.

The review of the season's work and results will be published in three articles, the first of which, entitled "Padi Manurial Experiments 1933-34" is included in this number.

Experiments on the manuring of padi have been made from time to time in various parts of Malaya. The results have at best been inconclusive. It must be remembered that manurial experiments with an irrigated crop, such as padi, present unique difficulties to overcome which special technique is necessary.

From the series of experiments which have been made on the subject of manuring of "wet" padi, emerge two facts of significance. The more important of these facts is the bar to higher yields which is found to apply to almost all padi areas in Malaya. There are, however, isolated areas where yields considerably higher than the bar are usual; the knowledge of the existence of such areas is a starting point for further investigations having for their object the elimination of the causes restricting crop production.

The second fact which has so far emerged from investigations is that where manuring has given an increased yield, phosphorus has been the essential element. The form in which this fertilizer should be applied, in what quantities, and at what time, are questions under consideration.

The importance of cultivation and the reaction of manures to conditions of cultivation of the crop are widely recognised. The present series of experiments has, therefore, been designed to give due weight to these factors. Although finality has not yet been reached, considerable progress has been made and in some instances, definite recommendations can be made regarding economic manuring of the padi crop.

Pollination of Oil Palms.

An oft-discussed but imperfectly understood subject of discussion centres on the pollination of the oil palm. The subject is, however, of such great importance that the planter cannot afford to neglect any aspect of it. He is committed to a policy of obtaining the maximum yield of fruit commensurate with the maintenance of vitality and normal development of the palm, but is handicapped by a not very precise knowledge of the method of natural pollination, of the normal or natural fruiting ability of the palm at different ages, or of the degree of artificial pollination which is advisable; if, in fact, taking a long view, artificial pollination is at any time justified.

Although we may feel how incomplete our knowledge is on this subject, the accumulated evidence of the past few years appears to counsel a conservative policy of obtaining the maximum yield of fruit commensurate with the maintenance of vitality and normal development of the palm, but is handicapped by a not very precise knowledge of the method of natural pollination, of the normal or natural fruiting ability of the palm at different ages, or of the degree of artificial pollination which is advisable; if, in fact, taking a long view, artificial pollination is at any time justified.

Organisation of Weekly Fairs.

H. H. Tunku Yacob, a son of H.H. The Sultan of Kedah, has prepared, at our request, a comprehensive account of the organisation of weekly fairs in the State of Kedah. By virtue of his official post of Assistant Principal Agricultural Officer, Kedah, the author has been intimately connected with the transforming of the earlier efforts to establish such fairs into the present organised and efficient system.

Weekly fairs have been started in many parts of Malaya. In some cases they have proved successful; in many others, interest has waned after the first flush of enthusiasm. But whether they have succeeded or failed, their desirability is admitted, and we suggest to those concerned that the experience obtained in Kedah will repay careful study.

The author has placed at our disposal much additional information concerning the conduct and development of these fairs in Kedah. Space forbids the presentation of all these facts in this Journal. Many of them are of local value, but readers who desire to examine this subject in greater detail, with a view to the development of similar fairs in other States, would be well-advised to get into touch with this Department when all available information will be forthcoming.

Original Articles.

PADI MANURIAL EXPERIMENTS 1933-1934

BY

W. N. C. BELGRAVE,
Chief Research Officer.

Summaries of results of manuring of padi have been given in this Journal for December 1932 and 1933. Once again the writer wishes to make it clear that the various Officers in charge of Stations should be regarded as co-authors of this series of articles.

The deductions drawn from previous experimental work were—

- (a) That whenever fertilizers gave results, phosphorus was found to be the essential element.
- (b) That there appeared to be a bar above which yields could not be raised by any system of manuring likely to be economic, either alone or in conjunction with close planting. The bar apparently varied from 400 to 550 gantangs (2,200 to 3,000 pounds) per acre, depending on soil type and water conditions and where, as is generally the case on the Stations, the normal yield approaches the hypothetical bar, manuring with commercial fertilizers gave only uneconomic increases.

Results in tanks indicated a considerable effect from the late addition of green matter on the surface of the soil and a similar good effect is observed from the bunds of cut vegetation used in the Krian District.

For the season under review, a complex experiment was accordingly designed to test the effect of the addition of green matter combined with manuring and with different forms of surface cultivation (this last at the suggestion of the Director of Agriculture).

Cultivation.—This took the form of (i) "changkolling"* to a depth of 6 in. to 7 in. as early as practicable before planting, designated "CE" (changkol early), (ii) similar treatment carried out as late as possible, "CL" and (iii) "tajaking" (in which existing vegetation was cut near or just below the inundated surface) just before planting, "T".

On the early changkollered plots, growing weeds or straw on the surface at the time of changkolling were turned in and just before planting these plots were either (a) re-changkollered wet to a depth of 5 in. to 6 in., the existing weed growth being buried (G. B.—i.e. green manure buried) or (b) re-changkollered very lightly or, if possible, tajaked—cut weeds remaining on or very near the surface (G. S.).

* Cultivation with a mattock or digging hoe, locally termed *chankol*.

On the late changkollod plots, the plots had either (a) vegetation buried, (G. B.) or (b) vegetation cut and removed before changkolling and afterwards replaced on the surface (G. S.).

On the tajaked plots, vegetation was all left on or near the surface (G. S.). There were thus five surface treatments:—

C. E. G. B.; C. E. G. S.; C. L. G. B.; C. L. G. S.; and T. G. S.

Plots carrying each of these treatments were divided into half-manured (M) and unmanured (O). Manured plots received a dressing at the rate of 100 lbs. sulphate of ammonia and 200 lbs. superphosphate per acre. These sub-plots were 1/120th acre each.

The lay-out was as follows:

		Direction of Water Flow				
		A	B	C	D	E
Columns	Rows	C|E	C|E	C|L	C|L	T
		G|S	G|S	G|S	G|S	G|S
		O|M	M|O	M|O	O|M	M|O
Columns	Rows	C|L	C|L	T	C|E	C|E
		G|S	G|B	G|S	G|B	G|S
		O|M	M|O	M|O	O|M	M|O
Columns	Rows	T	C|L	G|E	C|E	C|L
		G|S	G|B	G|S	G|B	G|S
		O|M	M|O	M|O	O|M	M|O
Columns	Rows	C|E	C|E	C|L	C|L	T
		G|S	G|B	G|S	G|B	G|S
		O|M	M|O	M|O	O|M	M|O

Double lines indicate bunds,

It will be noted that the lay-out is not strictly randomised; it was desired to avoid diffusion of nutrients as far as possible. The departure from strict randomisation was of less importance than it might normally have been in that the object of this somewhat elaborate experiment was to look, not for increases of the order of 10 or 20 per cent., but for large increases of yield which would suffice to take yields over the hypothetical bar.

On some of the Stations, the shape of the available land did not permit of the key-plan being strictly followed and columns or rows were placed end to end.

In Malacca there is little or no inter-season weed growth and extraneous non-leguminous green matter was brought in and used at the rate of 10 tons per acre.

The main experiment was carried out at the Experimental Stations at Titi Serong and Talang in Perak, Bukit Merah in Province Wellesley, Pulau Gadong in Malacca, at the Departmental Test Plots of Briah and Kuala Kurau in Krian, and, by the courtesy of the Kedah Government, at the Telok Chengai Station in that State. Results and general observations are as follows:—

Kedah.

Telok Chengai. Padi used: selected strain Radin 2. The area selected for the experiments had not been manured for three seasons, but had during this period been well cultivated by the usual methods of ploughing, raking and rolling and all straw had been returned to the soil.

Operations were carried out as follows:—

"C.E." Changkollod to a depth of 6in. to 7in, 16 weeks before planting.

Re-changkollod 10 days before planting.

"C.L." Changkollod 11 days before planting.

"T." Tajaked 28 days before planting.

Manures were applied 3 days before planting.

The plots changkollod early made the best growth, but as will be seen later, did not give highest yields. The results are shewn in Table I.

Table I.

Cultivation and Green Manuring Experiment at Telok Chengai, Kedah.
Mean Yields in Pounds of Padi.

Treatment	Pounds per 1/120th acre.		Pounds per 1/60th acre.	Gantangs per acre*
	Manured	Control	Manured + Control	M + O
C.E. G.B.	21.8	20.5	42.3	442
C.E. G.S.	24.0	21.2	45.2	472
C.L. G.B.	20.0	17.9	37.8	399
C.L. G.S.	24.5	22.0	46.4	484
T. G.S.	24.9	23.3	48.2	508

* Calculated from weight of samples from each treatment which ranged from 5.68 to 5.75 pounds per gantang.

As manures gave only small increases ranging from 6.5 to 13.6 per cent. and as inspection shows interaction between manures and treatments to have been absent, results were not statistically analysed with respect to manures but only with respect to treatments. This analysis showed significant differences to have occurred and the minimum difference required for significance ($P=0.05$) between any two treatments to be 3.0 lbs.

The real inferiority of green matter buried may possibly be ascribed to the ill effects of products of anaerobic decomposition, or to locking up of available supplies of nitrogen as a result of enhanced growth of the soil flora. The inferiority of early changkolling might be conceived to be due to the stirring up of toxic sub-soil, but for the facts that these plots showed superiority of early growth when toxicity should have been at its maximum and that padi roots normally penetrate below 6 or 7 inches, the limit of cultivation in this experiment.

Perak.

Titi Serong, Briah and Kuala Kurau. The experimental plots at Briah suffered from such severe rat damage that no deductions can be drawn from the results obtained. At Titi Serong, owing to the shape of the experimental block, the lay-out was modified by placing the 3rd, 4th and 5th columns of the key-plan above the 1st and 2nd. At the time it was not realised that the effect of the bunds of decaying vegetation used in the District was as extensive as observation on another experiment proved it to be, and the possibility exists that the outer columns were unduly favoured—as these all had green matter laid on the surface, any excess in yield of this treatment would be under suspicion. As a matter of fact, the run of yields in the sub-plots indicated that there was little or no bund effect in this block, even the outermost columns being too far from the bunds for it to manifest itself, but the results cannot be regarded as absolutely above suspicion.

At Kuala Kurau the standard lay-out was adopted.

At all three Stations early changkolling was done 17 weeks, and late changkolling 2 to 3 weeks before planting; tajaking, following local procedure, was carried out 5 to 6 weeks before planting. Results given in Table II have not been analysed as there are obviously no differences of the order sought—inspection suggests that minimum differences for significance would not exceed 15 per cent. of the mean.

The early changkollered plots showed better vegetative growth but this was not reflected in yield.

Talang.

The lay-out had to be varied at this Station by placing columns C, D and E at right angles to A and B; the direction of water flow was in both cases down the column.

Table II.

Cultivation and Green Manuring Experiment at Titi Serong and Kuala Kurau Stations. Mean Yields in Pounds of Padi.

Treatment	Titi Serong			Kuala Kurau		
	Manured 1/120th acre	Control 1/60th acre	Total 1/60th acre	Manured 1/120th acre	Control 1/60th acre	Total 1/60th acre
C.E. G.B.	24.6	15.1	49.7	31.4	31.4	62.8
C.E. G.S.	27.6	24.1	51.7	31.3	29.1	60.4
C.L. G.B.	23.4	24.0	47.4	28.3	28.6	56.9
C.L. G.S.	24.3	22.0	46.3	30.0	28.1	58.1
T. G.S.	25.8	25.6	51.4	28.1	30.5	56.6

Early changkolling was carried out 18 weeks before planting; re-changkolling, late changkolling and tajaking and manuring at the time of planting.

Ripening was uneven and the harvesting period was unduly prolonged, extending over three weeks. The results are shewn in Table III.

Table III.

Cultivation and Green Manuring Experiment at Talang Station. Mean Yields in Pounds of Padi.

Treatment	Mean Yield Pounds per			Gantangs per acre (calculated) M + O
	1/120th acre		1/60th acre	
	Manured	Unmanured	M + O	
C.E. G.B.	26.2	22.5	48.7	532
G.S.	23.8	19.4	43.2	471
C.L. G.B.	22.6	16.8	39.5	430
G.S.	24.4	21.8	46.2	504
T. G.S.	21.3	18.4	39.7	432
Mean	23.7	19.8		

Minimum differences for significance are for manures 1.13 pounds per 1/120th acre and for treatments 6.0 pounds per 1/60th acre. There is no significant interaction between treatments and manures.

Province Wellesley.

Bukit Merah. Columns had to be displaced to fit available land. Early changkolling was carried out 13 weeks and re-changkolling immediately before planting, late changkolling 4 weeks and tajaking 2 weeks before planting. Results are given in Table IV and the minimum difference for significance between any two treatments is 9.5 pounds per 1/60th acre.

Table IV.

Cultivation and Green Manuring Experiment at Bukit Merah Station.
Mean Yields in Pounds of Padi.

Treatment	per 1/120th acre		per 1/60th acre
	Manured	Control	Total
C.E. G.B.	22.5	24.2	46.7
C.E. G.S.	25.9	26.3	52.2
C.L. G.B.	18.6	21.7	40.3
C.L. G.S.	23.0	25.8	48.8
T. G.S.	23.7	24.7	48.4

Malacca.

Pulau Gadong.—Early changkolling was carried out four weeks before planting in the field, final preparation of "C.E." and sole cultivation of "C.L." and "T." plots from seven to seventeen days and manuring seven days before planting.

Minimum difference of significance between any pair of treatments is 8.2 lbs. and for manured over unmanured plots as a whole 1.5 lbs. The "Z" value for interaction is less than that required for significance, a somewhat surprising result in view of the considerable difference in the effect of manure in C.E. G.B., and T. G.S. This absence of significance is attributable to considerable variation within C.E. G.B.

Table V.

Cultivation and Manuring Experiment at Pulau Gadong Station.
Mean Yields in Pounds of Padi.

Treatment	Mean Yield. Pounds per			Gantangs per acre (calculated)
	1/120th acre		1/60th acre	
	Manured	Unmanured	M + O	M + O
C.E. G.B.	23.5	23.5	47.0	510
C.E. G.S.	24.4	20.4	44.8	487
C.L. G.B.	25.4	24.7	50.1	546
C.L. G.S.	23.8	20.9	44.7	487
T. G.S.	25.0	19.4	44.4	483
Mean	24.4	22.3		

General.

Very clearly in no single instance have the treatments undertaken given the substantial increases sought. In view of the possibility that deep cultivation may have a delayed beneficial action it has been decided for the coming season to treat all the plots in these experimental blocks uniformly according to the system adopted locally, *e.g.* tajak in Krian, plough and rolling in Malacca and so on. Any residual effect should thus be found.

Other Manurial Experiments.

In addition to the main experiment other simpler experiments were carried out at some of the Stations; these are described below.

Kedah.

Effect of Phosphate Fertilizers. Experiment to test the economic results, if any, likely to accrue at the present low price of padi, from application of phosphate fertilizers known to give 10 to 20 per cent. increase of yield.

A four-way Latin Square of 1/120th acre plots was laid down with the treatments and results given below on land at Telok Chengai Station which had received no manure for the past three seasons.

Difference required for significance between any two treatments ($P = .05$)
= 2.4 lbs. per 1/120th acre.

Table VI.

Phosphate Fertilizer Experiment at Telok Chengai Station.

Treatment	Rate pounds per acre	Yield	
		Pounds of Padi per 1/120th acre	Gantangs of Padi per acre (calculated)
I. Control		14.9	356
II. Bat guano * 21.9 per cent. $\text{I P}_2\text{O}_5$	500	20.1	416
III. - do - II	250	19.0	395
IV. Superphosphate 18 to 20 per cent. P_2O_5	200	21.9	454

The land was ploughed, raked and rolled prior to planting.

The cost of the local phosphate including freight was \$5.04 per ton; that of superphosphate was \$55 per ton. With padi at 5 cents per gantang, profit was: local phosphate 500 lbs. \$2.63 per acre, 250 lbs.—\$2.14 per acre and superphosphate \$0.74 per acre. This shows that the local practice of drawing on local deposits is justified when the unmanured yield is of the order of 350 gantangs or less, more especially as some residual effect is certain. Comparison of this simple experiment with the main experiment furnishes yet another indirect confirmation of the existence of the bar. In the main experiment, unmanured yields were higher, ranging from 17.9 to 23.3 pounds per 1/120th acre, and increases due to manures were correspondingly smaller, ranging from 1.3 to 2.8 pounds per 1/120th acre.

Residual Effect. Early in the season it was noticed that the padi on the plots manured in 1932—1933 for the planting distance experiments (described on page 633 of this Journal for December, 1933) was making better progress than that on the unmanured plots. Yields of the old plots were in consequence recorded. No manure was applied in 1933-1934.

* This so-called guano contains so little nitrogen that it may be regarded as a purely phosphatic manure.

Table VII.

Residual Effect of Fertilizers on Padi, Telok Chengai Station.
Yields of Padi in the Season 1933-34.

Treatment 1932-33	Yield 1933-1934	
	Pounds per 1/40th acre	Gantangs per acre calculated.
I. "Chellup"	65.1	482
II. Superphosphate 360 lbs. per acre	70.3	520
III. Super + ammonium sulphate as II + 110 lbs. ammonium sulphate	71.4	529
IV. Control	63.8	472

The Z value was .50 against .68 ($P = .05$) required for significance, but the minimum difference for significance required is 7.6 lbs. per 1/40th acre *i.e.* there is a strong probability, not amounting to odds of 20:1, that significance has been attained by II and III.

It must be remembered that the application of phosphate was heavy.

At Langgar in Kedah, a purely exploratory experiment was laid down in which four different varieties of padi were tried, arranged in a four-way Latin Square; two plots of each variety received 1,000 lbs. per acre of local phosphate. (This is the usual local application, repeated every third year).

Assuming, and there is evidence for the assumption, that there is no differential response of varieties to manuring, analysis shows that the increase obtained was significant; mean yield of manured plots was 21.5 lbs. per 1/120th acre and of unmanured 17.2 pounds.

Kelantan.

Pasir Puteh. A. Last year an experiment of six randomised blocks of 1/40th acre plots was carried out at this Station and described on page 635 of the December 1933 *Malayan Agricultural Journal*. This season the plots were observed for residual effect, except those carrying treatments 5 and 6, which received 5 tons green manure and 2 cwt. local phosphate per acre respectively. The results are given in Table VIII.

Table VIII.
Residual Effect of Fertilizers on Padi, Pasir Puteh Station.
Mean Yields of Padi.

Treatment - 1932 - 1933.	per 1/40th acre		Gantangs. per acre (calculated)* 1933-1934
	1932-33	1933-34	
1. Basic slag 2 cwts. cyanamide $1\frac{1}{2}$ cwts. sulphate of potash 1 cwt. per acre	64.3	45.6	332
2. Superphosphate (16 per cent.) 2 cwts.	55.2	42.8	311
3. Superphosphate + sulphate of ammonia $1\frac{1}{2}$ cwts.	58.5	44.8	326
4. Basic slag 2 cwts. + cyanamide $1\frac{1}{2}$ cwts.	57.5	46.4	337
5. Green manure 1 ton	44.7	46.8	340
6. Local manure†	41.0	40.8	297
7. Local bat guano (P_2O_5 16 per cent. N 1.8 per cent.) 4 cwts.	56.3	45.0	327
8. Control	33.8	34.8	253

Minimum difference for significance between any two treatments = 9.3 lbs. per 1/40th acre. Minimum increase over control for significance = 6.6 lbs. per 1/40th acre.

All treatments showed a significant increase, or significant residual effect, over the control.

B. In view of the large increase obtained by the use of local phosphate in 1932-1933, a simple experiment consisting of two three-way Latin Squares was laid down with plots of 1/120th acre each. The land had previously been used as a nursery and had received a uniform dressing of $1\frac{1}{2}$ cwts. Niciphos per acre. Applications and results are shown in Table IX.

* Calculated from weight at the rate of 1 gantang = 5.5 lbs.

† A mixture of burnt soil, burnt cow dung and ashes of coconuts and areca leaves in general use in Kelantan under the name "Baja Bakar".

Table IX.

**Manuring with Local Phosphate at Pasir Puteh Station.
Mean Yields of Padi.**

Treatment	Mean Yield pounds per 1/120th acre
<i>Square A.</i>	
Control	12.0
Bat Guano * 1 cwt. per acre	11.2
Bat Guano 2 cwts. per acre	11.0
<i>Square B.</i>	
Control	13.0
Bat Buano 3 cwts. per acre	14.5
Bat Guano 4 cwts. per acre	16.3

Variation was so great that no increases were significant. (The undesirable statistical lay-out was imposed by the lie of the land).

The small response from even as much as 4 cwts. of fertilizer per acre is surprising.

Central Experiment Station. Experiments were laid down to test a number of acid and basic mixtures, cow dung and green manure on (a) dry and (b) wet padi, (c) the optimum rate of application of local phosphate and (d) the optimum N/P ratio.

There was extensive lodging with some loss of seed, and bird and rat damage; for this reason, and because there are no differences of importance between the yields from various treatments and the controls, analysis has not been undertaken, and detailed results are not given.

Treatments were as follows:—

Experiments A and B were laid out in four six-way Latin Squares, two with dry and two with wet padi on 1/40th acre plots. The results are stated in Table X.

* Containing P₂O₅ 8 per cent. and N 0.8 per cent.

Table X.

Manuring "Wet" and "Dry" Padi at the Central
Experiment Station, Kelantan.

Mean Yield pounds of Padi per 1/40th acre.

Treatment	Rate per acre	Dry Padi	Wet Padi
1. Cyanamide	1½ cwts.	42.5	59.5
Basic slag	2 "		
Sulphate of potash	1 "		
2. Superphosphate	2 "	45.6	64.8
3. Superphosphate	2 "		
Sulphate of ammonia	1½ "	46.8	56.3
4. Basic slag	2 "	46.3	58.3
Cyanamide	1½ "		
Followed 1 month later by an additional 1 cwt. cyanamide			
5. Basic slag	2 "	49.3	63.5
Cyanamide	1½ "		
6. Control		48.1	61.3
7. Green manure	10 "	48.8	56.7
Bat guano	3 "		
8. As 7 + sulphate of potash	1 "	47.8	62.6
9. Bat guano	3 "	45.7	61.6
Sulphate of potash	1 "		
10. Cow dung	5 tons	51.3	62.0
11. Local manure		47.9	63.7
12. Control		46.1	61.5

Experiment C with "wet" padi was laid out as a four-way Latin Square with 1/60th acre plots. Results are stated in Table XI.

Table XI.

**Experiment in Optimum Rate of Application of Local Fertilizer
at the Central Experiment Station, Kelantan.**

Treatment	Rate per acre	Mean yields pounds of Padi per 1/60th acre.
Bat guano	1 cwt.	59.1
" "	2 cwts.	59.6
" "	3 "	55.4
Control		57.6

Experiment D with wet padi was laid out in a four-way Latin Square with plots of 1/60th acre. Means ranged from 37.9 pounds to 58.2 pounds per 1/60th acre, but there was considerable loss of grain and such great variation between plots that the results are valueless.

Province Wellesley.

Bukit Merah. Three additional experiments were carried out at Bukit Merah :—

- (a) a simplified version of the main experiment, on land used to test the possibilities of inter-season cultivation of vegetables.
- (b) an experiment to test the effect of cattle manure.
- (c) an experiment to compare different methods of preparing the land.

A. Late changkolling, with and without turning in of green matter, was compared with tajaking in three replications on plots of 1/80th acre divided into sub-plots of 1/160th, manured and unmanured. Limitation of space prevented further replications on larger plots. Results are shewn in Table XII.

Table XII.

**Cultivation and Manuring Experiment at Bukit Merah Station.
Mean Yields of Padi in Pounds.**

Treatment	Mean yield pounds		
	Per 1/160th acre		Per 1/80th acre M. + O.
	Manured	Unmanured	
C.L. G.B.	23.2	23.4	46.6
C.L. G.S.	23.8	23.5	47.3
T. G.S.	24.1	24.5	48.6

Perak.

Selinsing. The experiment to test tajaking against changkolling combined with manuring reported last year (page 638 *loc. cit.*) was repeated. Mean results in pounds of padi per 1/80th acre are stated in Table XV.

Table XV.
Cultivation and Manuring Experiment at Selinsing Station.
Mean Yields of Padi.

Treatment	Control	P	N. P.	Mean
Changkol	28.4	32.4	31.1	30.4
Tajak	20.4	24.2	25.0	23.2
Mean	24.4	28.3	28.1	

The minimum significant difference between changkol and tajak is 3.1 lbs. and between manures 3.4 lbs.

Last season changkolling was done after water was on the land; this season it was done during fallow.

Summary.

Once again attempts to lift yields over the "bar" have failed. Were it not for the existence of small patches of land regularly giving authentic yields of the order of 800 gantangs (4,400 pounds) per acre, it might be assumed that climatic conditions precluded really high yields of the order of those obtained in Japan, Spain and Italy. Such patches do, however, exist and investigation must continue.

The most promising result of the season's work is the fact which emerges from the Kedah experiment with local bat guano, that economic results may follow manuring with water-insoluble phosphates if, in spite of favourable water and weather conditions, yields do not approach within fifty gantangs of the "bar" and if fertilizer can be cheaply obtained.

Hitherto, only districts in close proximity to local deposits could benefit, imported fertilizers being far too expensive for this purpose. Recently, however, it has become possible to obtain locally, finely divided imported rock phosphate (P_2O_5 content 39 per cent.) at rates which, with properly organised distribution to avoid excessive middleman's profit, should not exceed \$1.60 to \$1.80 per cwt. in padi districts. Should experiments show that this material is efficient for the purpose, (and there is reason to believe that it will be) fifty gantangs increase, with padi even at six cents, would show a profit.

It is proposed to test this fertilizer during the 1934—1935 season.

OBSERVATIONS AND EXPERIMENTS IN CONNECTION WITH POLLINATION OF OIL PALMS

BY

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Assistant Botanist.

A question of considerable importance on many oil palm estates in this country is whether an increase in fruit production is obtained as a result of artificial pollination of the flowers of female inflorescences, or whether the amount of natural pollination which occurs provides the maximum economic yield.

As an approach to an examination of this subject, a study of the way or ways in which natural pollination is effected, was initiated.

Oil palms are undoubtedly wind pollinated. It has been stated occasionally, however, that various insects may also be concerned with pollination. This contention is probably largely due to the strong smell of aniseed given off by fresh pollen, and in a lesser degree, by receptive female flowers. (1) (2) (3) (4) (5).

The large monoecious inflorescences, the great abundance of small, dry, smooth pollen grains, the inconspicuous female flowers with large, slightly hairy stigmas, protruded and exposed at maturity, all indicate wind pollination (6).

Although neither the anthers nor the male inflorescences are easily disturbed by wind, nevertheless the inflorescences are borne on stalks long enough to project them well up from the axils of the leaves and produce pollen in such great quantities and over such large and exposed surfaces, that the wind can easily and gradually bear it away.

There is nothing to prevent successful pollination by almost any insect, but neither does there seem to be any property of the female flower to attract insects, except for the mild scent of aniseed.

A possibility, of course, is that winged pollen-feeders (certain beetles and flies) attracted to the male flowers in the first place by their stronger scent, might subsequently alight on a nearby female flower in pursuit of the same smell.

No recorded observations have clearly shown this, however, and pollen-collectors, such as bees, are very rarely seen in the vicinity of female inflorescences.

Although the aniseed smell not unnaturally incites attempts to find a reason for it connected with insect pollination, it is probable that logical examination must go further back.

According to Strasburger, certain characters of the flowers of angiosperms, such as attractive scents and coloured perianths, owe their origin to the occurrence of similar or analogous phenomena in a primitive ancestor at anthesis* only, these characters having been further developed when circumstances arose which proved them to be of value by attracting insects to assist in pollination (6) (7) (8).

It is probable, therefore, that the scent of aniseed from both male and female oil palm flowers is an undeveloped primitive character incidental with increased vitality at anthesis, but not directly concerned with pollination.

The abundance of pollen on male inflorescences is bound to attract a number of insects, especially bees, and those most commonly seen locally, visiting male inflorescences are *Apis indica*, F. the small honey bee, *Melipona laeviceps*, Sm. the small damar bee, and *Apis dorsata*, L. with long abdomen.

The first-named is the most conspicuous, but the second may often be seen in some numbers collecting the oil palm pollen which they carry away on their legs.

These bees do not visit female flowers, nor has the writer seen any winged insects on female inflorescences, though a few have been recorded by entomologists. (9) (10).

Frequently at night, a small moth, *Pyroderces centrophanes* Meyr. (Cosmopterygidae) (11) may be seen in large numbers on and about male inflorescences with freshly opened flowers. They lay their eggs in the pockets left by the extruded anthers, having been attracted to the inflorescences probably by the scent of the fresh pollen.

The only common insect recorded as a visitor to both male and female flowers in Africa is a small weevil (*Derelomus* sp.). Attempts have been made to connect this insect with pollination (1). It is stated that though it chiefly visits male inflorescences, it sometimes lays its eggs in female flowers (12).

Apart from the fact that it is chiefly the male inflorescences that this weevil visits, it is reasonable to assume that any value it may have as a pollinator, would be offset by the damage done in laying its eggs in the female flowers.

While the above observations were being recorded, an examination was also being made of the dispersal of the pollen by wind.

Several methods for measuring the density of pollen in the air were tried, but were found difficult to control, and were abandoned in favour of exposing slides during measured periods of time to obtain, by counts of captured pollen grains, an estimate of the deposition of wind-borne pollen.

The period of flowering on both male and female inflorescences is usually five days, but individual female flowers have been recorded as remaining receptive for three days only.

In order, therefore, to make an estimation of the amount of pollen in the air available for pollination of female flowers, a three-day exposure of slides was made at a fixed point in an oil palm plantation.

* Anthesis—The opening of the flowers, or flowering, including particularly the receptive period of the female reproductive organs and the ripening of the anthers.

The site chosen was at the base of a low hill facing west, in a small valley running south by west and north by east, and was fairly well exposed to the prevailing winds. A small board was hung as a shelf, on a mature palm, beside a female inflorescence, at a height of 10 feet from the ground.

Male inflorescences were noted on palms at distances of 28 feet and 50 feet; the further inflorescence being in the fourth day of flowering and situated to the south-west of the shelf, while the nearer inflorescence, to the east of the shelf, was just beginning to flower.

Ordinary 3 inch x 1 inch glass slides were used, and the central 2 inches of one side of each slide were coated with a mixture of four parts egg albumen to one part glycerine, spread on with a small paste brush.

Six slides, spaced three inches apart at marked positions on the shelf, were used for each exposure, and the first six slides were placed on the shelf at 11 a.m. on the first day. (21-2-33). Slides were changed each hour for the first eight hours, but exposures were then altered to two-hourly periods, which degenerated into four-hourly periods during the first night.

A table of results shows the amount of pollen collected at each exposure, with accompanying notes on variations of wind by personal observation only, as meteorological instruments were not available. Accurate records of wind and other phenomena would possibly have been more instructive.

Table of Results.

Date.	Hour (Suntime)*	No. of Pollen Grains.	Weather Observations.
21-2-33	11 a.m. to 12 noon	6	Gentle intermittent breezes.
	12 to 1 p.m.	5	
	1-2	1	
	2-3	2	
	3-4	0	Breeze stronger and a bit gusty.
	4-5	12	
	5-6	15	
	6-7	29	
	7-8)	102	Calm.
	8-9)		
	9-10)		
	10-11)		
	11-12 Midnight)	60	Very gentle breeze.
	12-1 a.m.)	87	
22-2-33	1-2)	238	Calm.
	2-3)		
	3-4)		
	4-5)		
	5-6)		
	6-7)		
	7-8)	40	Gentle breezes.
	8-9)		
	9-10)		
	10-11)		

* Official time in Malaya is 20 minutes in advance of sun time.

Date.	Hour (Suntime)	No. of Pollen grains.	Weather Observations.
22-2-33	11-12 noon)	88	Calm.
	12-1 p.m.)		
	1-2)	31	Freshening.
	2-3)		
	3-4)		
	4-5)		
	5-6)		
	6-7)	49	Rain.
	7-8)		
	8-9)	0	Very heavy rain. (No exposure of slides).
	9-10)		
23-2-33	10-11)		
	11-12 midnight)	27	Calm.
	12-1 a.m.)		
	1-2)	27	
	2-3)		
	3-4)	30	
	4-5)		
	6-7)		
	6-7)		
	7-8)	76	Light gusty breezes.
	8-9)		
	9-10)		
	10-11)	65	
	11-12 noon)		
	12-1 p.m.)	18	Very heavy rain. (Slides sheltered from the force of the rain).
	1-2)		
	2-3)	28	Calm.
	3-4)		
	4-5)		
	5-6)		
	6-7)	12	Gentle breezes.
	7-8)		
	8-9)		
	9-10)		
24-2-33	10-11)	44	
	11-12 midnight)		
	12-1 a.m.)	44	
	1-2)		
	2-3)	24	Windless and sultry.
	3-4)		
	4-5)		
	5-6)		
	6-7)	35	Gusty wind.
	7-8)		
	8-9)		
	9-10)		
	10-11)		

Wind rose about 11 a.m. on the 21st February as gentle intermittent breezes; was rather stronger and gusty that afternoon between 4 p.m. and 7 p.m. There was just enough to stir the leaves of the palms at about midnight when the near-by male inflorescence was exposing pollen freshly.

There was very little wind during the morning of the 22nd but it freshened at about 5 p.m. and there was rain from 9 to 11 a.m. It was calm during the night but at 9.30 a.m. on the 23rd, light gusty breezes sprang up. There was heavy rain from 1 p.m. to 3 p.m. and the rest of the afternoon was calm. At 11 o'clock that night, very gentle breezes arose again, but died away altogether towards the morning which was windless and sultry. There was a little more gusty wind at 10.30 a.m.

The average deposition of pollen is here shown to be 15.6 grains per 12 square inches per hour, or a little over one grain per square inch per hour. In other words, 94 grains per square inch were deposited in three days and this illustrates the quantity of pollen available for pollination over the period for which the female flowers are usually receptive.

The greatest amount of pollen was deposited from 1 a.m. to 5 a.m. on the 22nd February, but on one of the six slides a total of 172 grains was counted, most of which was in groups of from six to twenty grains. It occurred in a period of calm following some wind disturbance and may, therefore, need no other explanation, especially as this also coincided with the full flowering of a nearby male inflorescence; but as the other slides showed only 19, 2, 9, 12 and 24 grains respectively, it is possible that a bee, with pollen on its legs after visiting a male inflorescence, had in some accidental manner stumbled on to this slide.

This slide alone, however, does not affect the general conclusion, for though its elimination from the total count would reduce the average from 94 to 79 per square inch for three days, there is little practical difference between these figures.

This first experiment was conducted in February 1933 in the small area of oil palms in the Kuala Lumpur plantations and at the time the palms had few male inflorescences in flower.

Subsequently, similar series of exposures of slides were made in the much larger area at the Central Experiment Station, Serdang, during November 1933, and in a large estate during July, 1933.

On both these occasions an anemometer was used and was fixed near the crown of the palm on a level with the inflorescences and the tray of slides. In this position, however, it measured only the amount of wind in very localised eddies and was a poor index of the actual wind. A second anemometer up above the tops of the palms would have been necessary for accurate wind records.

Slides were exposed as described for the experiment in Kuala Lumpur, except that the mixture of egg albumen and glycerine was altered to three parts glycerine to two parts egg albumen, and was spread on the slide more thinly.

Furthermore, as it was decided that three hours was the most suitable period for successive exposures of slides, this period was adhered to throughout both these later experiments.

The estate in question covers an extensive area of undulating land and is, for the most part, well exposed to winds from any direction.

The site chosen for the experiment was on the western side of a hill in the centre of the estate, typical of the conditions of the estate.

The first six slides were exposed at 2 p.m. on the 5th July, 1933, and a fresh batch of slides was exposed every three hours up to and including 11 a.m. on the 8th July.

Male inflorescences which were in various stages of flowering from just commencing to almost over, were noted on palms at the following distances from the palm on which the slides were hung:—36 feet S.E., 225 feet W by N., 150 feet S.S.E., 130 feet E. by N., 100 feet N., 75 feet N. by E., and 35 feet N.E.

The "counts" of pollen obtained are as follows:—

Date.	Hour (Suntime)	No. of Pollen grains. (On 12 square inches.)	Humidity. per cent.	Temp. °F.	Weather Observations.
5-7-33	2 p.m.	—	72	85.2	Fresh breeze.
	5 "	190	73	84.0	Light shower of rain.
	8 "	63	95	77.1	Gentle breezes.
6-7-33	11 "	45	99	75.3	Calm.
	2 a.m.	38	95	75.0	Gusty wind.
	5 "	206	98	74.0	Calm.
	8 "	59	91	77.0	"
	11 "	20	70	85.6	"
	2 p.m.	18	69	87.2	Gentle breezes.
7-7-33	5 "	18	82	83.8	Calm.
	8 "	104	93	77.1	Dead calm.
	11 "	59	97	73.8	"
	2 a.m.	126	98	71.5	Heavy mist.
	5 "	14	98	71.5	Gentle breeze.
	8 "	2	89	77.8	Fresh breezes.
8-7-33	11 "	94	66	86.5	Fresh breezes, rain.
	2 p.m.	65	69	89.0	Strong wind.
	5 "	90	84	80.2	Fresh breezes.
	8 "	628	95	75.2	Heavy mist, shower.
	11 "	44	98	73.7	Calm.
	2 a.m.	7	99	72.9	Faint breeze.
	5 "	29	98	73.0	Foggy.
	8 "	27	92	76.7	Calm.
	11 "	5	75	84.5	Wind freshening.
	2 p.m.	53	92	76.3	Wind strong; heavy rain just commencing.
72 hours.		2004 grains per 12 sq. inches.			

This shows an average deposit of pollen of 167 grains per square inch in three days, and indicates that there is probably a very great deal of wind-borne pollen throughout the estate.

It was originally planned that the further series of exposures of slides should be made at the Central Experimental Station, Serdang, during the same month, but unexpected pressure of work in another direction prevented this, and suitable opportunity was not found until the following November.

The oil palm area at Serdang is situated in the north west corner of the Experiment Station, very largely on the sides of ravines and slopes facing towards the south east and sheltered a good deal on the north west by its own disposition and by an extensive area of hilly jungle along the western boundary of the Experiment Station.

The site chosen was in the centre of the area devoted to experiments in artificial pollination, on the side of a small hill facing towards the east.

The first six slides were put out at 2 p.m. on the 20th November, 1933, and changed at intervals of three hours up to and including 11 a.m. on the 23rd.

Male inflorescences in various stages of flowering were noted on palms at the following distances from the palm on which the slides were hung:— 30 feet W.N.W., 100 feet N, 110 feet E, 140 feet N.N.E., 190 feet N.N.E., 215 feet N.N.W., 170 feet N.N.W., 195 feet S, 140 feet S.W., 200 feet W.S.W., 195 feet N.N.E., 170 feet N.N.E. and 110 feet N.

The "counts" of pollen obtained are as follows:—

Date.	Hour (Suntime)	No. of Pollen grains. (On 12 square inches.)	Humidity. per cent.	Temp. °F.	Weather Observations.
20-11-33	2 p.m.	—	74	86.5	Air faintly stirring.
	5 "	18	83	82.2	Wind freshening.
	8 "	233	93	75.0	Light showers of rain.
21-11-33	11 "	88	99	74.2	Gentle rain.
	2 a.m.	34	97	73.5	Fine and calm.
	5 "	40	97	72.8	Dead calm.
	8 "	8	95	74.0	Gentle breezes.
	11 "	40	75	83.8	Fine and bright.
	2 p.m.	68	78	83.5	Air almost still again.
22-11-33	5 "	3	87	80.4	Gusty breezes.
	8 "	82	95	77.0	Dead calm.
	11 "	249	97	74.1	Light mist.
	2 a.m.	108	97	73.5	Calm.
	5 "	8	98	72.8	Faint breeze.
	8 "	6	91	76.4	Just freshening.
	11 "	3	71	84.8	Gentle breezes.
	2 p.m.	8	66	86.5	" "
	5 "	147	93	78.0	" "
23-11-33	8 "	62	97	73.5	Fairly heavy rain.
	11 "	26	100	72.3	Rain just over.
	2 a.m.	38	99	72.5	Calm.
	5 "	2	99	72.5	Very
	8 "	3	90	75.8	gentle
	11 "	25	80	81.7	breezes.
	2 p.m.	6	81	79.5	Gusty wind.
72 hours.		1305 grains per 12 sq. inches.			

This shows an average deposit of pollen of 109 grains per square inch in three days, which is an indication that a considerable amount of pollen is distributed by wind, and although the count is much lower than that obtained in the estate experiment, it would give the impression that there is adequate wind-borne pollen available for pollination of female inflorescences.

It is not intended to compare the results of these two single experiments at different times of the year, but it may be observed, that apart from the much higher total count obtained on the estate, which is largely accounted for by 628 grains for the period from 5 to 8 p.m. on the 7th July, 1933, the deposition of pollen was a good deal more evenly distributed than at Serdang.

This coincides with observations on the incidence of wind on each occasion for, on the estate, the wind, though generally of less strength, came in steadier gusts than at Serdang, where it reached the oil palm plantation in sudden gusty swirls.

Conclusions.

The results of these observations and experiments show that oil palms are, for all practical purposes, entirely wind-pollinated, and that although pollination by insects is not impossible, it is probably largely accidental and is never likely to be significant.

These experiments also give one reason to believe that, in estates and large plantations of average palms, particularly those in which the palms are sufficiently well exposed to prevailing winds, naturally wind-borne pollen is likely to provide the optimum pollination of female flowers.

The effects of artificial pollination on young palms require further study.

On account of its short stem, the dense crown of leaves typical of a young oil-palm forms an effective screen against wind-borne pollen, as a result of which its female inflorescences are but lightly pollinated.

Artificial pollination considerably increases the yields of fruit from young palms, (13) (14) (15) but there is some evidence to show that such assistance to fruit production in young palms may adversely affect their mature yields. (16) (17) (18). It is possible that the screen of leaves on a young palm acts as a natural protection against over-pollination.

The requirements of stands of specially selected palms and the possibilities in conjunction with manuring and cultivation have also to be examined more fully.

References.

- (1) Chevalier, A. Documents sur le Palmier à Huile. Paris 1910.
- (2) Bucher, H. and Fickendey, E. Die Ölpalme. Leipzig 1919.
- (3) Rutgers, A. A. L. Mededeelingen van het Algemeen Proefstation der A.V.R.O.S.—Algemeene Serie No. 8. Medan 1920.
- (4) Milsum, J. N. Crop Records of Oil Palms. *Malayan Agricultural Journal*, 1920, Vol. VIII, 247.

- (5) Hill, A. G. G. and Mason, T. G. The Pollination of the Oil Palm. Fourth Ann. Bulletin Agric. Dept. Nigeria. Lagos 1925.
 - (6) Knuth's Handbook of Flower Pollination. English Translation by J. R. Ainsworth-Davis. Oxford 1906.
 - (7) Strasburger, E. Die Bestäubung der Gymnospermen. Jenaische Zs. Natw. VI. Jena 1871.
 - (8) Strasburger's Text Book of Botany. Fifth English Edition by W. H. Lang, D.Sc., F.R.S. London 1921.
 - (9) Gater, B. A. R. Insects on African Oil-Palms. *Malayan Agricultural Journal*, 1925, Vol. XIII, 250.
 - (10) Government Entomologist, Department of Agriculture, S.S. & F.M.S. Further Records (unpublished).
 - (11) Identification by Government Entomologist, Department of Agriculture, SS. and F.M.S.
 - (12) Beccari, O. Contributo alla conoscenza della Palma a olio. *L'Agricoltura Coloniale*, 1914.
 - (13) Milsum, J. N. and Curtler, E. A. Pollination Experiments with Oil-Palms. *Malayan Agricultural Journal*, 1926, Vol. XIV, 384.
 - (14) Marsh, T. D. Observations on Oil Palms. *Malayan Agricultural Journal*, 1928, Vol. XVI, 20.
 - (15) Marsh, T. D. Observations on Oil Palms. *Malayan Agricultural Journal*, 1929, Vol. XVII, 16.
 - (16) Records of local estate yields (unpublished).
 - (17) Waters, H. B. Notes on a visit to the Oil-Palm Plantations of Sumatra and Malaya in 1926. Sixth Ann. Bull. Agri. Dept. Nigeria. Lagos 1927.
 - (18) Bunting, B., Eaton, B. J. and Georgi, C. D. V. The Oil Palm in Malaya. *Malayan Agricultural Journal*, 1927, Vol. XV, 297.
 — Milsum, J. N. The African Oil Palm in Sumatra. *Malayan Agricultural Journal*, 1921, Vol. IX, 90.
 — Fickendey, E. and Blommendaal, H. N. Ölpalme. Hamburg 1929.
 — Hensser, C. Investigations on Oil Palms by Dr. A. A. L. Rutgers and others. Medan 1922.
 — Jagoe, R. B. Notes on the Oil Palm in Malaya, with Special Reference to Floral Morphology. *Malayan Agricultural Journal*, 1934, Vol. XXII, 541.
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WEEKLY FAIRS IN KEDAH

BY

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It is only logical that in any country the indigenous population should have some interest in the business which goes on in it; yet in Malaya an outsider on his first arrival would be greatly struck by the peculiar conditions which he meets. Almost all branches of business in the towns, from the management of the firms down to the insignificant odd jobs, are in the hands of people not of Malay blood. In short, there are indeed very few local business undertakings in which the Malays have any share.

The Malays and Commercial Development.

The process of dispersion of Malays from the settlement begins when it is still a village. As soon as a village attains sufficient importance to attract people of other races to start business, the Malays, instead of assisting in the work of betterment and uplift of local conditions, withdraw to quieter places where they can settle. In doing so they have often to start afresh by reclaiming or bringing under cultivation new areas of swamp or jungle.

It would be reasonable to suppose that the Malays would have been the first to profit by the rise of a village and the increased value of the land which they owned, and to have taken advantage of the situation by building a shop, or two, on their land and setting up their own businesses. The reason why they do not do this is obvious; they have no business training and cannot hope to compete with the new-comers, many of whom already possess commercial experience.

Many of these immigrants have business connexions elsewhere in Malaya as well as in their own countries, so that they are better able to arrange for the importation of foreign articles which are in local demand. Further, many of these people have experienced hardship and poverty in their own countries and have been trained to run their businesses along economical and profitable lines.

In their gradual retreat from the towns the Malays have brought under cultivation more and more areas of jungle and swamp. They have planted fruit and other useful trees in the former and wet-rice in the latter. On their return to the land they can find sufficient means to support themselves and their families; it is only when they have surplus quantities of produce that they find themselves faced with a problem.

It is evident that home industries are threatened with total extinction unless means can be found to stimulate production. At one time even the clothes which a Malay wore and several other articles which he carried about with him

were manufactured locally. Today many of the former home-made goods are not to be found, or are difficult to obtain.

As in many other countries, it would be almost a practical impossibility to try and revive home industries on a commercial scale against such heavy odds as the Malays are now facing in the shape of cheap machine-made articles.

With limited markets and in isolated units, Malay commercial enterprise is liable to fall an easy prey to other business bodies. In addition, the Malays have a curious desultory and spasmodic habit of conducting their businesses compared with the more tenacious and laborious methods of immigrant races. They may also change from one business to another, when they observe, or even imagine, that there is appreciably more profit to be gained by the latter and they seldom if ever stop to think of the consequences of over-production. An example of this was found at one fair, when on one occasion fourteen animals were killed for sale, where the average demand was six animals per week.

There is still a great deal to be done to avoid undue local competition and uneven distribution of produce, as the law of supply and demand is not properly understood by the people. At the same time, it would be against all the principles of the present movement to discourage local production where it is possible to arrange for supplies to be distributed evenly over a wider field.

The Work of the Weekly Fairs Committee.

The marketing of surplus production is one of the problems which is engaging the attention of the Weekly Fairs Committee appointed in 1932. This is a small official committee whose duties are to organise, manage and supervise weekly fairs throughout the State of Kedah.

Weekly fairs were started about ten years ago but, mainly through lack of organisation, they enjoyed no long success. The three fairs which survived were taken over by the Committee, many old fairs were revived and new ones opened. All are conducted on a uniform system.

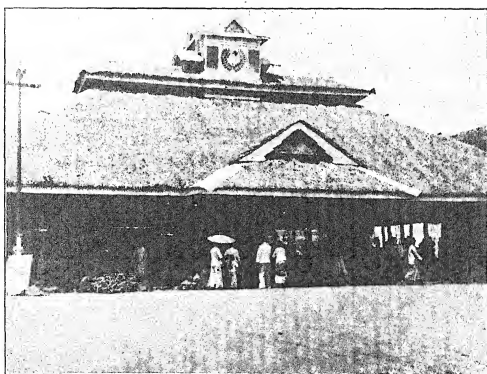
Although the power vested in the Committee is as stated above, it is chiefly concerned with general organisation and management. It fixes rules and regulations in regard to locality and sites, days on which fairs are to be held, conditions of sale, slaughter of animals for meat, designs of the buildings, charges for stalls, the allotment of the reserve funds, auditing of accounts kept at each centre, and the organisation of animal shows and the weekly fair at Alor Star.

Organisation of the Fair.

The cost of the building of each of the fairs in Kedah, except the main central fair at Alor Star, is financed by one or more persons who reside in the locality in which the fair is situated. If the construction is undertaken by one man he is free to run the fair in any way he prefers as regards the funds allotted to him, but he is still bound by the rules which apply to weekly collections from persons using the fair.



A WEEKLY FAIR DIRECTION POST IN KEDAH.



THE WEEKLY FAIR AT ALOR STAR, KEDAH.



The sites generally approved for the fairs are accessible by road, river, or by sea. Wherever possible, Government land is selected, but often in important localities, Government land is unobtainable, so that privately-owned land is rented on agreement for as long a term of years as possible.

Sometimes the fairs are located in the interior mukims approachable only by foot-paths. In these cases, the sites chosen are the first points touched by the peasants on reaching a main road, or cross-roads, for if the peasants have to pass a wayside shop, or shops, before reaching a fair, the articles they bring may be sold en route.

Near a big town the site chosen is often between the village with the biggest agricultural population and the town. This is essential to prevent the peasants from being intercepted by tradesmen and the produce sold at a smaller price than would have been obtained at the fair.

The days on which the fairs are to be held are fixed by the Committee and are arranged so that any two fairs taking place on the same day are far enough apart to avoid clashing. The shortest distance apart at which two fairs could be economically held on the same days is 10 to 12 miles.

An interval of two or more days is considered necessary for the holding of two closely connected fairs in order to give time to the sellers to collect materials for each.

It has been found necessary to regulate the sale of produce in the fairs in order to eliminate undue competition. This may appear to be an unprogressive course. At the present stage of development the whole organisation depends for its success on a certain amount of protection. The Malays, as has already been shewn, are still in the transition stage of business training and any discouragement due to unregulated competition would completely upset the objects of the scheme which the Committee has set itself to work out.

Among the articles for sale at most fairs are rice, cakes, ghee, wild honey, fruits and vegetables in season, agricultural implements, domestic goods and wild animals. There are about fifteen different articles of which the Malays have an absolute monopoly of sale at the fairs.

Owing to the excessive number of animals slaughtered and the consequent lowering of prices of meat, it has been found necessary to regulate the number of animals to be slaughtered at each fair. In this connexion the Committee has laid down regulations regarding slaughtering, which include supervision of slaughter, number of cattle to be slaughtered—decided by priority of applications—and inspection of animals before slaughter. Only persons residing in the vicinity of a fair are allowed to slaughter animals for sale at that fair.

Designs of the buildings vary slightly in different places according to the amount of capital and materials available, but on the whole the main buildings are constructed in very much the same manner. They are long and spacious sheds having double-span roofs, with a wide space between the first and the second roof to provide ventilation, and supported on high posts.

The stalls within are in rows, one along each side and one through the middle, and extend from end to end of the building. The gangways are sufficiently wide to enable a fairly large number of people to transact their business comfortably, or take shelter in rainy weather.

Other buildings consist of one large shed for women-sellers of vegetables, fruits, cakes, etc., and several small separate sheds and stalls, where ice, sherbert, coffee and food of the usual kinds common to the Peninsula are sold.

Charges up to thirty cents per person are imposed at each fair on all those who come to sell. Articles valued at less than 50 cents are allowed to be sold free of charge by both sexes, and articles up to \$1 are allowed to be sold free of charge if they are brought for sale by women.

Capital.—The share-capital for the erection of the buildings at the fairs is collected among the local Malays. These people often supply all the building materials, such as timber and attaps, and construct the buildings themselves. The buildings are then assessed according to the value of the various materials used and the amount of labour employed.

Reserve Funds.—Out of the total weekly collection, the Committee insists on a certain percentage being set aside as a reserve fund for the purpose of meeting possible liabilities. The remainder, after deducting all expenses, is declared as a dividend and paid to the shareholders.

Accounts and Audit.—The account books of the fairs, which are in the Arabic character, are kept on a uniform system as approved by the Registrar of Co-operative Societies, who is for the time being, the auditor.

Organisation of Annual Shows and the Weekly Fair in Alor Star.

The first annual show was held in Alor Star in April 1933 and was considered a great success. Owing to financial considerations no show was held in 1934 though it is hoped to arrange for another show to take place at Sungei Patani in the near future.

The Weekly Fair at Tanjong Charlie, Alor Star.

The Tanjong Charlie Fair is maintained by the Government and is under the direct supervision of the Committee.

The fair is assisted by the Penghulu of Kota Star, a caretaker and four assistants who are engaged for the number of days the fair is held in each month.

The primary object was to ascertain how a fair consisting mostly of Malay business men and women would succeed in the town and how they would succeed in competition with the business population.

The Committee held out so little hope of success that it would not even countenance the idea of spending any money on the construction of a shed. What little shelter was available was supplied by an abandoned cattle quarantine shed which was barely sufficient to give protection for more than three lorry-loads of vegetables and fruits.

After two or three weeks' trial, the Committee felt convinced that the fair would succeed and a temporary attap roof was hurriedly constructed to cover the open quarantine yard.

From this time onwards the fair gradually increased in size and importance till it reached its present magnitude. Now, more than seventy bus-loads of fruit, vegetables and other produce come to the fair every Wednesday. In addition, there are a number of sellers who come on bicycles, in motor-cars, or boats and on foot. The turnover, per week, averages about \$1,800.

The weekly attendance, at a moderate estimate, is between 2,000 and 2,500, and the number of people who come to sell is about 400.

At this fair, only Malays are allowed to sell and, even with this strict condition, the buildings are not large enough for the requirements.

The Tanjong Charlie Fair, or Pekan Rabu, as it is generally known, is intended to be a training centre for other weekly-fairs. The Malays there are taught the use of scales, the use of weights and measures, proper arrangement and display of their merchandise in a manner attractive to the customer. Strict rules are enforced to ensure cleanliness of the buildings and of the articles brought for sale. There is also ample opportunity for new arrivals to learn to sell things at a profit and in a business-like manner.

It may be added that the chief business deficiency among the Malay peasants is their inability to make simple mental calculations and to determine the face-values of most articles they sell; in very many cases the articles are undervalued.

Permanent stall-holders at this fair include sellers of spices, fruits and vegetables, cigarettes and tobacco, Malay medicine, carpentry, pottery, preserves and padi-planting implements. Other stall-holders include a watch repairer, a bookseller, in addition to several eating shops.

General Work of the Committee.

Additional activities of the Committee are mainly concerned with propaganda, with the object of increasing the popularity of the fairs, by lectures, erection of sign posts, advertising fairs by posters and pamphlets and demonstration of methods of cultivation of vegetables.

In lecturing to the people the Chairman often speaks on suitable agricultural subjects with special reference to the work of the weekly fairs; the Registrar of Co-operative Societies lectures chiefly on economic subjects.

Sign-boards are placed at all suitable places, such as the junctions of roads and at the central weekly fair at Tanjong Charlie; at this fair a large board over 20 feet high bears a complete list of the weekly fairs established in the State. Sign-boards giving the names of the fairs, and the days of the week on which they are held, are placed at the sides of the roads a few hundred feet from all approaches to the fairs. The descriptions given are in three languages, namely, Malay, Chinese and Hindustani. On the top of each board is mounted a traffic danger signal.

Advertisement posters are circulated to all the fairs when there is any occasion for doing so. Circulars, with an up-to-date list of all the fairs, are printed and distributed free to the people from time to time.

Owing to general illiteracy, especially among the female peasant population, the Committee considers it advisable to use a distinguishing sign by which the fairs can be easily recognised. The design adopted is in the form of a crest, which bears a "tajak" and a "changkol", surrounded by a wreath representing "sireh" leaves. The weekly fair sign is mounted over all flag-posts and sign-boards.

Demonstration plots are attached to the big fairs where possible; the idea is to demonstrate to the people the best methods of cultivating different useful vegetables and money-crops.

By means of the weekly fairs the produce of the soil can be evenly and profitably spread over all parts of the State and sold either directly by the owners themselves at the fairs or indirectly through the Malay middlemen.

It is greatly to be hoped that when the fact is fully realised by the Malays that they are much behind other races in commerce and industry, it may lead them to the revival of these important branches of occupation in which they once took a prominent part. The number of fairs in the State, the attendance and the business turnover, give a clear indication of the business instinct awakening among them.

Extent of Progress.

The fact that there are now forty-two fairs in operation is an indication that they have become very much part of the life of the people. The average turnover per week is about \$12,000. During the fruit season the turnover is larger, but this only lasts for about three or four months in the year. The total number of people who come to sell is about 3,000 per week. A fair percentage of these have taken up the business permanently, others are part-time sellers and those who wish to make the best use of their time between padi seasons.

The attendance, per week, at all the fairs is about 21,000. Of the total number of people attending, more than three-fourths are Malays. The fairs have come to be regarded by the Malays not only as places in which business is transacted, but also as meeting places. In North Kedah, people living within a radius of 10 miles gladly come to the fairs on foot with things for sale. At the fairs various topics bearing on local problems are freely discussed with officials and others.

Opportunities have been taken by Government officials to distribute medicine, to sell properties by public auction, to advertise shows, to display posters conveying useful information in relation to food and hygiene, and to announce by means of notices the latest developments in Government policy affecting the people.

The advantages derived from these fairs can be seen in many directions. More and more immigrant races have left and a large number of Malays have

come forward to do the work themselves; an improved market has been found for many products; fruit growing has gained in popularity; and passenger traffic has increased.

While there may be other advantages gained by the establishment of weekly fairs, the final aim in establishing them, as previously mentioned, is to teach the Malay people the importance of trade and industry. Some may lose money in the beginning, but such losses should not be large enough to discourage them, because the business only entails the investment of small capital. A loss, on the other hand, would serve to teach them to be careful, thrifty and more business-like. Success, however, would serve to eradicate the deep-seated conservatism respecting shop-keeping industry and commerce.

The fairs have received much assistance from many Government Departments. On the other hand, these events have been made use of by Government and have greatly facilitated the collection of taxes.

Summary and Conclusions.

In a little over two years, weekly fairs in Kedah have increased from three to forty-two. This has been achieved through the Committee appointed to organise this work. This Committee has regulated the whole conduct of the fairs, but has allowed the control to rest with those who finance the ventures.

The conclusion is reached that where the Malay population is in the majority and where padi fields, fruit orchards and Malay homesteads are large and numerous, weekly fairs are a natural and essential adjunct as they form centres in which the Malays can sell their surplus produce and buy in return, at reasonable prices, articles for their home needs.

In places in the southern districts, where there are fewer Malays in proportion to other nationalities, fairs are not of the same importance as they are in the north. In spite of this fact, fairs have become permanently and successfully established.

It is most encouraging to note that there is at present every indication of gradual business and commercial awakening among the Malays. The consciousness of the fact that they are at present far behind other people in this direction may be instrumental in bringing about a general revival of trade and commerce among them.

Acknowledgment.

The writer is much indebted to Mr. W. N. Sands, the Principal Agricultural Officer, Kedah, for his kind help and criticism in the preparation of this article.

MALAYA AT THE CANADIAN NATIONAL EXHIBITION, TORONTO, 1934.*

This year marked the Centenary of the City of Toronto, for which reason the Exhibition was more widely advertised and had many special features and attractions. The attendance shewed an increase of about 88,000 over last year's figures.

The Malayan stand, in a commanding position, occupied 640 square feet as compared with 384 square feet in the previous year. The main portion of the stand was devoted exclusively to pineapple propaganda, the chief purpose of Malaya's participation, but one end was set apart for tourist propaganda.

Pineapple cookery demonstrations were given thrice daily and attracted eager audiences. Considerable attention to the Malayan stand was given by the Press. In addition, the Publicity Officer delivered two National broadcasts on Malaya, in each of which reference was made to the pineapple exhibits and demonstrations at the Exhibition.

The Malayan exhibits impressed upon the public that the Malayan canned pineapple represents the highest value for money on the Canadian fruit market. A still more important service which it was able to perform, however, was that of introducing for the first time "Choice" quality Malayan pineapple to the Canadian public. It should be mentioned that in Canada, "Choice" denotes what in England is known as "Golden" quality, the Canadian equivalent for G.A.Q. (Good Average Quality) being known as "Standard". Until now, Malayan pineapple has only been known in the "Standard" quality, selling at an average price of 10 cents gold in the stores, as compared with 20 to 25 cents gold per can obtainable for the Australian and South African brands and for Cuban pines packed in Canada. The Malayan stand was mainly instrumental in getting this new Malayan quality firmly established.

"Standard" quality Malayan canned pineapple is entirely a price proposition on the Canadian market. That is to say, it holds its enviable position simply because it is cheap, and until recently, there has been little attempt made to extol it as having any particular merits in point of quality. Now that the quality has definitely improved under the stricter supervision introduced, there is a tendency to advertise it as a good quality article at a cheap price. Nevertheless, under present conditions it must still be considered as commanding its market simply because it falls within reach of the less affluent classes. Indeed, its very cheapness operates against it in the minds of many housewives able to afford the Australian or South African article; they refuse to buy Malayan pineapple simply because they cannot believe that the contents of a 10 cents can could possibly be up to the mark.

Palm Oil.

A small exhibit of Malayan palm oil products was displayed on the stand. It aroused considerable interest, and led to the introduction of this product to at least one important firm who wish to develop the trade in Canada.

*The following is abridged from the report of the Publicity Officer from the Malayan Information Agency, London, who was in charge of the Malayan Stand at the Exhibition.

Reviews.

Malayan Agricultural Statistics 1933.

By D. H. Grist. *Special Bulletin, Economic Series No. 5, Department of Agriculture, S.S. and F.M.S. 1934. Price 50 cents (Straits Currency).*

This is a compilation of statistics, drawn from various sources, concerning Malayan agriculture in the year 1933. It includes import and export figures for some years past of agricultural products which might be grown locally, areas and production of the principal agricultural crops, market prices in 1933 and meteorological data.

The present is the third year of publication of this annual statistical summary. Its scope has been widened with each successive issue; the first contained 63 tables, whereas the present number has 82 tables, two graphs and a comprehensive index.

Notes on Hymenopterous Parasites of Padi Pests in Malaya.

By H. T. Pagden. *Special Bulletin, Scientific Series No. 15, Department of Agriculture, Straits Settlements and Federated Malay States, 1934. Price 50 cents (Straits Currency).*

In this paper, Mr. H. T. Pagden, formerly Assistant Entomologist, Department of Agriculture, S. S. and F.M.S., records two Dryinids, *Pseudogonatopus hospes* Perk. and *Haplogonatopus* sp. near *americanus*, a Mymarid, *Paranagrus optabilis* Perk. and a Trichogrammid, *Oligosita* sp. as parasites of *Sogata furcifera* Horv. He describes the method of attack of the two Dryinids and gives notes as to the stage of host attacked, frequency of attack and parthenogenesis which in these species "appears to be the rule rather than the exception". He also records three hyperparasites from the cocoons of both the species of Dryinids. With regard to *Paranagrus optabilis* Perk. and *Oligosita* sp., he experienced considerable difficulty in determining their true host but finally established them to be parasites of the eggs of *Sogata furcifera*. In addition to the above mentioned, an unidentified parasite from the pupa and five egg parasites of *Schanobius* are recorded, and one, *Phanurus beneficiens* Zehnt. he discusses in some detail. The development of its larva is described and illustrated and he suggests that the mandible-like appendages which Berlese calls antennae are of use to the larva in destroying possible competitors, since "if an egg of *Schanobius* or *Diatraea* is exposed to attack by *Trichogramma* and later exposed to *Phanurus*, it is always the *Phanurus* which survives". Of the parasites mentioned in this paper, *Phanurus beneficiens* Zehnt. is considered the most important of *Schanobius*, and *Paranagrus optabilis* Perk. of *Sogata*.

Mr. H. T. Pagden, who has been seconded for service in the Solomon Islands, was only able to make "random observations" on these insects, since his work in Malaya particularly concerned the control of lepidopterous stem borers of padi by means of the mass production of *Trichogramma japonica* Ashm. Nevertheless, these random observations are of decided interest and a useful contribution to the literature of the hymenopterous parasites of *Sogatia* and *Schranobius*.

G. H. C.

DISTRICT AGRICULTURAL SHOW.

Kuang, Selangor.

The second show at this centre was held at the Malay School on 4th November 1934. It was opened by the Hon'ble the British Resident, Selangor.

The number of exhibits in most classes was very satisfactory, though in many instances the quality left much to be desired.

Educationally, the event was a success. Exhibitors were able to see the improvements which they can make in preparing their agricultural products for market. Demonstrations were held and special exhibits staged by Government Departments which had for their purpose the improvement of hygiene in the villages, the housing and feeding of poultry, the preparation of improved rubber, and the advantages of co-operation in agriculture.

A baby show was held at which a demonstration in midwifery was given; nursing and feeding the child were also demonstrated.

ERRATA.

Experiments on the Cultivation and Manuring of Coconuts.

(*Malayan Agricultural Journal* Vol. XXII, No. 11, 1934).

Table IV.

Estate A.

1932	Nuts per palm	<i>read</i>	cover buried	...	47.0
			clean weeded and cultivated	...	48.8
			clean weeded only	...	48.8

Estate E.

1933	Nuts per palm	<i>read</i>	cover buried	...	64.8
			clean weeded and cultivated	...	76.8
			clean weeded only	...	75.0
			L N P K	...	75.0

Estate F.

First half					
1934	Nuts per palm	<i>read</i>	cover slashed	...	22.4

Estate G.

First half					
1934	Percentage	<i>read</i>	clean weeded only	...	112.1

Table V.

Estate B.

.	Nuts per palm	<i>read</i>	cover buried	...	6.5
			clean weeded and cultivated	...	11.1
			clean weeded only	...	10.4

Estate D.

	Pounds per palm	<i>read</i>	clean weeded	...	33.5
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Estate E.

	Pounds per palm	<i>read</i>	L N P K	...	40.5
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Estate F.

	No. of nuts percentage	<i>read</i>	N P K	...	100.3
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Estate G.

	Nuts per palm	<i>read</i>	control	...	13.5
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Table VI.

1931	Nuts per palm	<i>read</i>	control cover slashed	...	9.4
			clean weeded	...	17.1
First half					
1934		<i>read</i>	lime, cover slashed	...	49.3
			percentage		

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

The Weather.

With the exception of parts of Kedah, where heavy rains early in the month gave way to hot dry conditions, the central areas of Perak and Negri Sembilan, the inland and south coastal districts of Selangor, and the central districts of Johore, where conditions were very dry, average precipitations were recorded. Appreciable flood damage was reported from Kedah and the riverine mukims of Lower Perak, while minor flooding occurred in practically all districts in Province Wellesley North and Penang, and to a lesser degree in the coastal and southern districts of Pahang.

Remarks on Crops.

Rubber.—A general price decline has been reported from all centres. In Kelantan the discrimination is mainly against the better qualities, and increased attention is therefore being given to the manufacture of lump.

Excessive rains which were general throughout the Peninsula appreciably restricted production by limiting the operations of tapping and collection. Inundation of holdings has been reported from the northern areas of Perak, and the west coastal areas of Johore.

Favourable conditions have assisted the distribution and spread of mouldy rot disease. The departmental sales of approved fungicides have been maintained, and an endeavour to stimulate voluntary control in centres where the disease has become virulent has been made by staging demonstrations of approved methods of treatment. There is, unfortunately, a strong feeling among a large body of small-holders that heavy rains neutralise the effect of fungicides.

Improvements in the general upkeep of small holdings continue to be maintained, and in many cases the manufacture of better quality rubber is reported. These improvements are due, in a large measure, to the instructional work carried out by the officers of the Small-holders' Advisory Service.

Padi.—Planting in the Krian Irrigation area this season is computed at approximately 48,397 acres as compared with 49,060 for the previous season. Flowering has commenced in several centres and the gradual withdrawal of water supplies from fields is expected to commence early in December. Insect pests have caused but slight damage, while depredations by rats—although on the increase during the period under review—have been of no particular consequence. It is reported that an increased measure of control has been general throughout the district. Crop prospects generally are very good.

Crop destruction due to flood damage in Kedah is estimated at about 2,840 acres, Kubang Pasir and Kota Star Districts being principally affected. The

Muda river broke through the bund at Pekula and submerged a large area of crop and destroyed approximately 248 acres. Lesser floodings were also reported from Province Wellesley North, and in the coastal and southern areas of Pahang. In the riverine mukims of Lower Perak District, many of the areas under cultivation were submerged continuously for some three weeks.

Harvesting has commenced in the Jelebu and Kuala Pilah Districts of Negri Sembilan, and in the riverine and coastal mukims of Pahang and parts of Selangor. The irregularity of planting has resulted in considerable bird damage.

In the newly-opened areas of Sungei Manik, Perak, planting has been continued and good growth has been reported in the earlier planted centres. At Panchang Bedina in Selangor, water supplies are now adequate but planting material is limited, due to earlier water shortage, and pest damage in nurseries.

In Kelantan, planting is practically completed and the crop is making good progress. The dry padi crop did not recover from the set-back experienced in the early stages of growth and yields will suffer in consequence.

Coconuts and Copra.—A smaller demand for fresh nuts in the Burma markets declined the nut price to \$13 per thousand. The competition by middlemen in this trade continues to be keen.

The copra produced on the improved kiln at Sri Menanti, Johore, is now being sold locally at a satisfactory price. The second improved kiln erected at Ringgit, Batu Pahat, was opened during the month and commenced operations. Arrangements are in hand for the erection of kilns of similar type at Serkat and Ayer Baloi.

In Perak South, the kiln at Sungei Nipah commenced working and produced good quality copra which obtained a satisfactory price. Another small-holders' kiln at Sungei Balai is preparing to restart with a view to producing good quality dry copra. Advisory visits to a number of other kilns with the object of effecting improvements have been maintained.

Patchouli.—With an increase in price for dried leaves, attention has been paid to the harvesting of areas which have been in a state of abandonment for some considerable time in the Segamat District of Johore.

Pineapples.—Prevailing weather conditions appear to be responsible for retarding the ripening of fruit which is very scarce in Johore and Singapore. In the former State, four factories commenced operations during the month but closed down owing to short supplies.

Agricultural Stations.

The demonstration plot for Sakai at Anak Ayer Denak in Perak has been cleared and fenced. The planting of fruit trees will be undertaken as soon as supplies are available.

On most stations tea pruning has been completed and the bushes dressed with the standard pruning mixture. Owing to the incidence of this operation

the yield of made tea at the Experimental Station, Tanah Rata, declined to 1651 pounds during the month.

Further progress with the development of stations in Labuan and Brunei has been reported.

Padi Stations and Test Plots.

At Telok Chengai Experiment Station and the four test stations in Kedah, very satisfactory progress has been made by the crop which has completely recovered from the severe flooding previously experienced. A number of the earlier strains have commenced to flower and an excellent harvest is anticipated.

At Titi Serong Experiment Station and the mukim test plots in Krian, conditions are equally satisfactory. Water supplies are adequate and pest damage only slight.

At the new Sungei Manik Station developmental work is making progress and it is anticipated that stumping and burning will be completed by the end of the year. Severe flooding has necessitated arrangements for raising earth-works three feet above ground level to accommodate with safety the store and quarters.

At Talang, the Hong Kong variety Lam Shum Tsim was harvested during the month; a considerable loss of grain was suffered due to bird damage. The Sze Min variety is now nearing maturity: it has a longer maturation period, and would appear to be a heavier yielder than the former. The ripening in both cases is very uneven.

Of the newly opened plots in the Panchang Bedina area, flooding delayed transplanting at Tanjong Karang where seedlings were destroyed. At Panchang Bedina nurseries were successively destroyed by mole crickets during the early part of the season when conditions were dry, and later by floods. The third sowing is apparently successful. Cultivation and transplanting is in progress at Sungei Haji Durani where the Pentatomid bug *Scotinophara coarctata* and leaf-eating caterpillars did serious damage to nursery seedlings.

Bee-Keeping.

A supply of bee-keeping accessories was imported and hives of the small native bee (*Apis indica*) installed at departmental headquarters in Kedah, for observation and instructional purposes.

Mushroom Cultivation.

An edible fungus, which appears to be identical with the padi straw mushroom cultivated in China, the Netherlands Indies and Province Wellesley and described in the *Malayan Agricultural Journal*, Vol. XXII, No. 1, January 1931, was found to occur naturally in Kedah on heaps of padi straw following the prolonged rains of the past few months.

Poultry.

An outbreak of disease reported from Matang Gerdu, Briah, in Perak, towards the end of the month was promptly investigated by the Veterinary Inspector. The outbreak, which was thought to be Diphtheritic-stomatopharyngitis was confined to one flock only. Material for examination was despatched to the veterinary authorities and the Institute for Medical Research.

Outbreaks were also reported from the Lipis District of Pahang, and the Pontian, Endau and Kukup Districts of Johore.

Models of poultry houses and accessories have been received in all centres. These will serve for demonstration purposes in conjunction with itinerant lectures on poultry management.

Rice Mill Temerloh.

The mill buildings and machinery assembly are nearing completion, and it is expected that trial operations will be undertaken early in December.

The District Officer, Temerloh, the State Agricultural Officer, Pahang, and the Malay Agricultural Assistant, Pahang South, paid a visit to the Government Rice Mill, Bagan Serai, during the month to observe the methods of large-scale milling.

School, Home Garden, and Kampong Competitions.

The second preliminary judging of school gardens in Krian and Selama, Perak was carried out during the month and the final judging will be completed before the commencement of Mohamedan fasting month, early in December.

The final judging of school gardens in Pahang East was completed during the month, the standard attained being very satisfactory.

There has been a wide response to the home garden competition now being held in the Selama sub-district, Perak. Many scholars, particularly in Tebing Tinggi and Ijok have entered. The first judging is now in progress.

In Pahang, judging in kampong and home garden competitions is practically completed. The standard is reported to be higher than that of the previous year. In the Pekan District 57 gardens competed, the prize being won by a Kuala Pahang entrant who obtained 90 per cent. of the total marks.

District Padi Competition.

The first competition of this kind to be held at Batu Pahat, Johore, took place on November 15th: 269 samples were entered, the best five being retained for participation in a State Competition where selections will be made to represent the State in the All-Malayan Competition, held in conjunction with the Malayan Exhibition in 1935. Requirements for show standards were explained and demonstrated.

Agricultural Shows.

The second Mukim Agricultural Show was held at the Malay vernacular school, Kuang, on November 4th.

All sections were well represented, the exhibits in many cases being of excellent quality. The outstanding feature of the show was the number and quality of exhibits in the poultry sections.

DEPARTMENTAL NOTES.

Change of Title.

It is notified for general information that, with the approval of the Right Honourable the Secretary of State for the Colonies, the title of the appointment of Director of Agriculture, Straits Settlements and Federated Malay States, has been changed to Director of Agriculture, Straits Settlements and Advisor on Agriculture, Malay States. (No. 5551 *F.M.S. Government Gazette* November 30th 1934).

Tour of Director of Agriculture.

The Acting Director of Agriculture visited Fraser's Hill between 11th and 13th November for the purpose of inspecting the Dairy Farm at Jeriau.

Visit of Officer-in-Charge of Copra Investigations to the Philippine Islands.

Mr. F. C. Cooke, Officer-in-Charge of Copra Investigations, who left for the Philippine Islands on October 16th, returned on December 5th.

All aspects of the coconut industry were discussed and views on the economic problems of that industry were exchanged with officials of the Department of Agriculture and Commerce and with leading merchants to whom introductions were effected through the courtesy of His Britannic Majesty's Consul-General, Mr. Thomas Harrington.

Later Mr. Cooke and Mr. F. Gallang, Senior Agronomist of the Bureau of Plant Industry, paid a visit to the largest single area of coconuts in the Philippine Islands which is to be found in Southern Luzon.

Subsequently, coconut areas in Mindoro, Romblon, Cebu, Bohol, Zamboanga and Davao were similarly inspected, introductions being effected through the courtesy of His Britannic Majesty's acting Vice-Consuls at Cebu, Zamboanga and Davao respectively and the Director of the Bureau of Plant Industry at Manila.

Leave.

Mr. B. A. Lowe, Agricultural Officer, has been granted 8 months and 3 days full-pay leave from 23rd November 1934 to 25th July 1935 inclusive.

Statistical.

MARKET PRICES.

November 1934.

Rubber.—The price of rubber weakened still further during November, the lowest quotation being 20 cents per lb. The commodity opened at 21½ cents per lb. for spot loose in Singapore and closed at 21½ cents, but the average price for the month was only 20.93 cents per lb. for Smoked Sheet equal to London Standard, as compared with 22.76 cents per lb. in October. The average price for November in London was 6.29 pence per lb. and in New York 12.91 cents gold per lb. as compared with 6.75 pence and 13.78 cents gold respectively in October.

Weekly prices paid during the month for small-holders' rubber at three centres are shewn in the following table.

Table I.
Weekly Prices Paid By Local Dealers for
Small-Holders' Rubber, November, 1934.
(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.					Kuala Kangsar, Perak.				Batu Pahat, Johore.			
	1	8	15	22	29	7	14	21	28	7	14	21	28
Smoked sheet		23.16	24.00	22.70	24.17	23.30	24.28	23.25	24.00	22.60			21.60
Unsmoked sheet	22.13	22.30	21.63	21.28	21.78	20.22	20.10	20.51	21.40	20.50	21.00	20.51	20.60
Scrap			13.00	13.44	13.50			13.00					

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang \$1.24 per picul, Seremban to Singapore \$8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway \$6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway \$10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

Palm Oil.—The following prices for the local commodity were quoted during the month.

Table II.

Date 1934.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
Nov. 2	£13.15.0	£ 6. 7. 6
„ 9	14. 0.0	6. 7. 6
„ 16	13.15.0	6 5. 0
„ 23	14.10.0	6. 7. 6

Copra.—Prices in Singapore during November shewed little variation, but towards the close of the month, values shewed some small appreciation, and the mixed quality maintained its high value in relation to the sun-dried grade. The latter grade opened at \$2.95 per picul and closed at \$3.05, averaging \$2.95 per picul for the month, as compared with \$3.01 in October. The mixed quality averaged \$2.70 per picul as compared with \$2.52 in October.

Copra cake was quoted throughout the month at \$1.70 per picul.

Rice.—The average wholesale prices of rice per picul in Singapore during October were as follows:—Siam No. 2 (ordinary) \$3.14, Rangoon No. 1 \$3.15, Saigon No. 1 (long grain) \$3.05, as compared with \$3.39, \$3.30 and \$3.30 in September. Corresponding prices in October 1933 were \$3.48, \$2.87 and \$3.12 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in October were:—Singapore 26, Penang 25, Malacca 24, as compared with 26, 25 and 26 respectively in September.

The average declared trade value of imports of rice in October was \$3.36 per picul, as compared with \$3.38 in September and \$3.03 in August.

Padi.—The price paid for padi at the Government Rice Mill, Bagan Serai continued at \$1.50 per picul. A privately-owned mill paid \$1.30 per picul.

Tea.—Bigia (Kedah) tea was quoted at 10½d. per lb. in London during October.

Average London prices per lb. for tea consignments from other countries were as follows:—Ceylon 1s. 2.25d., Java 10.08d., Indian Northern 1s. 0.82d., Indian Southern 11.5d., Sumatra 9.58d. Prices improved slightly at the commencement of the month, but weakened again at the close.

Tuba Root (Derris).—A much firmer note was prevailing in the Singapore market at the close of November. Continued wet weather is curtailing supplies

and, in expectation of higher prices in the new year, growers are not gathering roots. The average price in Singapore for roots sold on fair rotenone content remained unchanged at \$40 per picul but the average for better qualities was \$44 per picul. Roots sold on a basis of ether extract averaged \$29 per picul during November as compared with \$28 in October.

Gambier.—Singapore prices remained unchanged during November, quotations being \$6.75 per picul for Block and \$9.50 per picul for No. 1 Cube as compared with October average prices of \$5.81 and \$8.94 respectively.

Pineapples.—Very little business was passing during November and prices per case remained unchanged at : Cubes \$3, Sliced Flat \$2.85, Sliced Tall \$3.25. October prices were \$3.05, \$3 and \$3.25 respectively.

Average prices of fresh pineapple in Singapore was \$2.50 per 100 for large fruits and \$1.50 per 100 for small. Johore prices varied in districts from \$1.20 to \$3 per 100. Kedah prices were from \$2 to \$6 for Mauritius pines, and \$7 to \$10 per 100 for Sarawak pines.

Tapioca.—There was no change in Singapore prices during the month and quotations per picul were :—Flake Fair \$3.50, Seed Pearl \$5.50, Pearl Medium \$5.85. October average prices were :—\$3.45, \$5.50 and \$5.85 respectively.

Tobacco.—Local prices varied within a wide range according to quality. Perhaps a fair average is that reported from Perak where 1st quality was \$30 to \$50 per picul, 2nd quality \$24 to \$46 and 3rd quality \$8 to \$34. The price of fresh leaf was about \$1.50 to \$4 per picul.

Sago.—Prices in Singapore of Flour, Sarawak Fair, improved during November, averaging \$2.16 per picul as compared with \$2.03 in October, but Pearl, Small Fair weakened to average \$3.72 per picul as compared with \$3.90 in the previous month.

Mace.—Prices in Singapore continued unchanged during the month at the October level of \$90 per picul for Siouw and \$60 per picul for Amboina.

Nutmegs.—There was no change throughout the month in the Singapore prices of nutmegs which were \$26 per picul for 110's and \$27 per picul for 80's, as compared with \$25 and \$26 respectively in October.

Pepper.—Prices improved still further during November but eased a little at the close in sympathy with London. Average prices per picul in Singapore for the month were :—Singapore Black \$21.25, Singapore White \$62.25, Muntok White \$64.25. The October average prices were \$18.88, \$55.50 and \$57.38 respectively.

Cloves.—Prices in Singapore remained nominal at Zanzibar \$35 and Amboina \$45 per picul.

Coffee.—Prices of coffee in Singapore opened weakly but there was a slight improvement during the month. Sourabaya coffee opened at \$17 to \$18 per picul rising to \$18 to \$19.50. Palembang coffee opened at \$12.75 per picul and closed at \$13, an average for the month of \$12.94 as compared with \$12.44 in October.

Local prices of coffee appreciated over those ruling last month. Prices varied from \$18 to \$29 in different districts and according to quality.

Arecanuts.—Singapore average prices per picul in November were as follows:—Splits \$4.87 to \$6.25, Sliced \$8 to \$9.78, Red Whole \$5.65 to \$6.56, Sourabaya Whole \$6.50 to \$7.56. No prices were quoted for Bila Whole.

The average prices quoted by the Singapore Chamber of Commerce were:—Best \$5.92, Medium \$5.55, Mixed \$5.14.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133½ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY*

October 1934.

Malaya.—Imports of foreign rice into Malaya during October were 53,018 tons and exports 20,300 tons, net imports accordingly being 32,718 tons. For the period January to October, 1934, net imports were 385,304 tons, an increase of 7.6 per cent.†

Of the imports during October, 59 per cent. were consigned to Singapore, 12 per cent. to Penang, 4 per cent. to Malacca, 16 per cent. to the Federated Malay States and 9 per cent. to the Unfederated Malay States. Of the total, 74 per cent. came from Siam, 24 per cent. from Burma, 1 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during the month under review, 73 per cent. were shipped to the Netherlands Indies and 27 per cent. to other countries. The various kinds of rice exported were:—Siam 13,855 tons (68.2 per cent.), Burma 3,852 tons (19 per cent.), French Indo-China 523 tons (2.6 per cent.), India 1,962 tons (9.7 per cent.), local production 108 tons (0.5 per cent.).

India and Burma.—For the period January to September 1934, foreign exports totalled 1,194,000 tons, as compared with 1,564,000 tons in 1933, a decrease of 23.7 per cent.

Total exports of rice and bran for the period 1st January to 29th September 1934, amounted to 3,247,874 metric tons, an increase of 17.7 per cent. as compared with 2,759,983 metric tons in 1933.

According to the *Indian Trade Journal*, 25th October 1934, the total planted area was reported to be 75,261,000 acres, an increase of 0.2 per cent. as compared with the corresponding estimate of 75,080,000 acres for the season 1933-34. Weather conditions were not favourable but the condition of the crop in October appeared to be generally good.

Siam.—Exports of rice from Bangkok during September were 151,167 tons, making a total of 1,334,942 tons for the period January to September 1934, as compared with 1,231,077 tons in 1933.

The padi crop for the 1933-34 season was 4,967,980 tons, a decrease of 107,810 tons as compared with the previous season.

Japan.—According to the *Trans Pacific Journal*, 18th October 1934, the following are the estimated figures for supply and demand for the period November 1934 to October 1935.

<i>Supply:</i>	Production	...	...	7,391,300 tons.
	Balance 1933-34 rice year	...	...	2,244,040 "
	Imports	...	...	1,683,030 "
<i>Demand:</i>	Domestic consumption	...	...	9,817,670 "
	Exports	...	...	280,500 "

showing a surplus of 1,220,200 tons.

* Abridged from the Rice Summary for October, 1934, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1933.

The area for the second rice crop of Formosa was estimated to be 935,000 acres, a decrease of 26,137 acres as compared with the second crop of 1933. Production was estimated at 657,035 tons, an increase of 36,683 tons or 5.9 per cent. as compared with the second crop of 1933.

French Indo-China.—Entries of padi into Cholon, 1st January to 31st October 1934 totalled 1,360,720 metric tons, an increase of 38.8 per cent. as compared with 980,565 metric tons in 1933.

Exports of rice for the same period were 1,272,540 metric tons, as compared with 1,090,892 metric tons in 1933. An increase of 16.7 per cent.

Netherlands Indies.—The area under rice in Java and Madura harvested during the period January to August 1934, (*Economic Bulletin*, 1st November 1934) was 8,020,090 acres, as compared with 8,215,220 acres in 1933, a decrease of 2.4 per cent.

Imports of rice for this period were 126,349 metric tons, a decrease of 54.3 per cent. as compared with imports of 276,344 in 1933.

Ceylon.—Imports for the period January to October 1934, totalled 391,238 tons, an increase of 9.1 per cent. as compared with 358,626 tons in 1933.

Of the 1934 imports, 14.4 per cent. were from British India, 62 per cent. from Burma and 23.6 per cent. from other countries.

Europe and America.—Shipments from the East to Europe for the period 1st January to 25th October 1934, were 1,027,305 tons, as compared with 1,120,502 tons in 1933, a decrease of 8.3 per cent.

Of the 1934 shipments 37 per cent. were from Burma, 5 per cent. from Japan, 46 per cent. from Saigon, 10 per cent. from Siam and 2 per cent. from Bengal. The 1933 percentages were 49, 2, 41, 7, and 1 respectively.

Shipments to the Levant from the East for the period 1st January to 5th October, 1934, totalled 25,789 tons, an increase of 13.9 per cent. as compared with 22,639 tons in 1933.

Shipments to the West Indies and America for the period 1st January to 25th September, 1934, were 158,993 tons, as compared with 137,836 tons in 1933, an increase of 15.3 per cent.

MALAYAN AGRICULTURAL EXPORTS, OCTOBER, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-Oct. 1933.	Jan.-Oct. 1934.	October 1933.	October 1934.
Arecanuts ...	20,756	17,733	15,386	2,803	817
Coconuts, fresh † ...	100,609†	86,401†	84,288†	7,947†	11,922†
Coconut oil ...	17,568	14,713	20,698	1,665	2,350
Copra ...	110,543	86,765	76,627	13,728	9,951
Gambier, all kinds ...	2,560	2,027	1,827	225	229
Oil cakes ...	9,992	8,373	9,777	757	1,522
Palm kernels ...	1,983	1,713	2,624	280	547
Palm oil ...	12,101	9,247	13,182	2,129	2,943
Pineapples canned ...	59,582	51,271	59,230	1,553	2,393
Rubber ¶ ...	459,836¶	372,787¶	385,956¶	41,409¶	34,075¶
Sago,—flour ...	7,648	3,787	6,631	1,182	1,071
„ —pearl ...	2,646	1,917	4,084	273	533
„ —raw ...	4,420*	3,482*	5,526*	412*	790*
Tapioca,—flake ...	9,881	8,691*	5,138	741	199
„ —flour ...	702*	182	1,656*	13	180*
„ —pearl ...	17,297	14,568	13,246	1,636	1,169
Tuba root ...	569½	399½	446½	56	24½

† hundreds in number.

* net imports.

¶ production.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPIABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 30TH OCTOBER, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (d)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)		AREA OF TAPPIABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5) (9)	Percentage of (9) to (2) (10)
		Acreage (3)	Percentage of (3) to (2) (4)	Acreage (5)	Percentage of (5) to (2) (6)	Acreage (7)	Percentage of (7) to (2) (8)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,285	1,129	2.5	7,412	16.7	609	1.4	8,541	19.2
Province Malacca	7,368	112	1.5	935	12.7	314	4.2	1,047	14.2
Province F.M.S.	121,152	485	0.4	15,216	12.6	2,818	2.3	15,701	13.0
Penang Island	1,366	390	28.6	424	31.0	201	14.7	814	59.6
Singapore Island	28,842	2,820	9.7	4,751	16.5	495	1.7	7,571	26.2
Total S.S.	203,013	4,936	2.4	28,738	14.2	4,237	2.1	33,674	16.6
FEDERATED MALAY STATES :—									
Perak	253,227	4,403	1.7	34,751	13.7	13,884	5.5	39,154	15.4
Selangor	310,003	4,083	1.3	40,438	13.0	12,601	4.1	44,521	14.3
Negri Sembilan	233,592	4,981	2.1	33,258	14.2	18,654	8.0	38,239	16.3
Pahang	46,712	4,357	9.3	14,052	30.1	9,308	19.9	18,409	39.4
Total F.M.S.	843,534	17,824	2.1	122,499	14.5	54,447	6.5	140,323	16.6
UNFEDERATED MALAY STATES :—									
Johore	365,400	8,908	2.4	23,925	6.5	21,562	5.9	32,833	8.9
Kedah (b)	126,588	1,632	1.3	28,816	22.8	19,550	15.4	30,448	24.1
Kelantan	23,793	8,477	32.8	2,391	9.3	5,418	21.0	10,868	42.1
Terengganu (b)	4,543	NH	NH	98	2.2	98	2.2	98	2.2
Perlis (c)	1,181	NH	NH	266	22.5	266	22.5	266	22.5
Total U.M.S.	523,505	19,017	3.6	55,496	10.6	46,894	9.0	74,513	14.2
Total MALAYA	1,570,052	41,777	2.7	206,733	13.1	105,578	6.7	248,510	15.8

Notes :—(a) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
 (b) Registered Companies only.
 (c) Rerendered quarterly.
 (d) Figures are as reported by estate managers.

TABLE I
MALAYA RUBBER STATISTICS
STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX,
FOR THE MONTH OF OCTOBER, 1934, IN DRY TONS.

State Territory	Stocks at beginning of month 1		Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			
	Ports	Dealers	during the month	January to Oct. inclusive 1934	during the month	January to Oct. inclusive 1934	during the month		January to Oct. inclusive 1934		during the month		January to Oct. inclusive 1934		Ports	Dealers		
							Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES:—																		
Federated Malay States	...	13,189	9,546	12,986	19,046	5,428	85,959	Nil	Nil	Nil	Nil	13,241	5,847	148,102	67,667	...	12,402	9,721
Johore	...	3,081	2,796	3,923	37,433	2,545	43,178	Nil	124	Nil	896	1,741	6,360	16,488	66,668	...	1,759	2,609
Kedah	...	684	2,001	2,935	27,300	736	14,456	Nil	Nil	Nil	Nil	1,392	2,220	14,682	27,169	...	354	2,890
Perlis	...	23	11	136	11	288	Nil	Nil	Nil	Nil	Nil	33	Nil	431	...	...	21	15
Kelantan	...	211	281	283	2,540	496	6,637	Nil	319	Nil	177	682	980	8,592	...	...	242	170
Trengganu	...	55	50	189	2,253	93	1,124	Nil	Nil	Nil	Nil	284	Nil	3,277	...	...	55	50
Total Malay States	...	17,243	14,692	20,333	108,722	9,381	151,042	Nil	124	319	896	16,551	15,426	180,357	173,822	...	14,833	14,955
SETRAITS																		
Malacca	...	3,162	976	1,630	14,070	314	...	Nil	Nil	4	...	3,459	...	32,572	...	...	3,338	1,075
Province Wellesley	...	1,504	443	618	3,745	50	...	Nil	Nil	Nil	...	...	...	...	...	...	1,623	543
Dindings	...	89	144	112	1,086	62	23,258	Nil	13,854	Nil	161,621	6,670	Nil	81,177	...	...	58	153
Penang	...	9,695	12,735	9	11	120	146	1,581	...	23,368	...	...	...	...	...	...	3,026	12,081
Singapore	...	7,431	42,170	174	217	1,869	161	8,615	...	163,048	...	...	...	...	...	...	7,927	42,074
Total Straits Settlements	...	10,126	59,633	1,746	2,388	22,898	1,773	23,298	10,226	13,854	161,621	30,494	Nil	366,396	Nil	10,553	59,174	1,974
Total MALAYA	10,126	76,896	16,438	22,921	217,616	11,154	174,340	10,226	13,978	18,656	162,017	47,045	15,426	566,646	173,822	10,553	74,007	16,929

TABLE II
DEALERS' STOCKS IN DRY TONS

Class of Rubber	Federated Malay States		Straits Settlements		Penang		Province Wellesley		Johore		Kedah	
	21	22	23	24	25	26	27	28	29	30	31	32
DRY RUBBER	11,115	36,195	9,826	4,781	1,169	191	...	...	...	...	...	...
WET RUBBER	1,297	5,879	2,245	288	590	163	...	...	...	...	...	...
TOTAL	12,412	42,074	12,081	5,019	1,759	354	...	...	...	...	...	...

TABLE IV
DOMESTIC EXPORTS

Area	January to Oct. 1934	
	For month	For Oct. 1934
Malay States	...	31,678
Straits Settlements	...	3,853
MALAYA	...	35,530

TABLE III
FOREIGN EXPORTS

Ports	January to Oct. 1934	
	For month	For Oct. 1934
Singapore	...	30,601
Penang	...	11,114
Port Swettenham	...	3,044
Malacca	...	5,983
MALAYA	...	47,043

- Notes:—*
- Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
 - The production of estates of less than 100 acres is estimated from the returns of the estates (Columns 15) + (16) + (19) + (20) + (21) + (22) + (4) = (51) - (16) - (17) - (18) - (19) - (20) - (21) - (22) = 10,126 tons. For the Straits Settlements, Column (9) : figures for Singapore and Penang Islands represent sales or exports as shown by consignment and for the mainland represent as previously purchases by dealers from local estates of less than 100 acres, reduced by 15% to terms of dry rubber.
 - Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15 1/2% wet sheet, 25% scrap, lump, etc., 40%.
 - Column (31) represents domestic exports, being net exports from the country. Column (32) represents net exports from the country. Column (33) represents net exports from the country. Column (34) represents net exports from the country. Column (35) represents net exports from the country. Column (36) represents net exports from the country. Column (37) represents net exports from the country. Column (38) represents net exports from the country. Column (39) represents net exports from the country. Column (40) represents net exports from the country. Column (41) represents net exports from the country. Column (42) represents net exports from the country. Column (43) represents net exports from the country. Column (44) represents net exports from the country. Column (45) represents net exports from the country. Column (46) represents net exports from the country. Column (47) represents net exports from the country. Column (48) represents net exports from the country. Column (49) represents net exports from the country. Column (50) represents net exports from the country. Column (51) represents net exports from the country. Column (52) represents net exports from the country. Column (53) represents net exports from the country. Column (54) represents net exports from the country. Column (55) represents net exports from the country. Column (56) represents net exports from the country. Column (57) represents net exports from the country. Column (58) represents net exports from the country. Column (59) represents net exports from the country. Column (60) represents net exports from the country. Column (61) represents net exports from the country. Column (62) represents net exports from the country. Column (63) represents net exports from the country. Column (64) represents net exports from the country. Column (65) represents net exports from the country. Column (66) represents net exports from the country. Column (67) represents net exports from the country. Column (68) represents net exports from the country. Column (69) represents net exports from the country. Column (70) represents net exports from the country. Column (71) represents net exports from the country. Column (72) represents net exports from the country. Column (73) represents net exports from the country. Column (74) represents net exports from the country. Column (75) represents net exports from the country. Column (76) represents net exports from the country. Column (77) represents net exports from the country. Column (78) represents net exports from the country. Column (79) represents net exports from the country. Column (80) represents net exports from the country. Column (81) represents net exports from the country. Column (82) represents net exports from the country. Column (83) represents net exports from the country. Column (84) represents net exports from the country. Column (85) represents net exports from the country. Column (86) represents net exports from the country. Column (87) represents net exports from the country. Column (88) represents net exports from the country. Column (89) represents net exports from the country. Column (90) represents net exports from the country. Column (91) represents net exports from the country. Column (92) represents net exports from the country. Column (93) represents net exports from the country. Column (94) represents net exports from the country. Column (95) represents net exports from the country. Column (96) represents net exports from the country. Column (97) represents net exports from the country. Column (98) represents net exports from the country. Column (99) represents net exports from the country. Column (100) represents net exports from the country.

METEOROLOGICAL SUMMARY, MALAYA, OCTOBER, 1934.

LOCALITY.	AIR TEMPERATURE IN DEGREES FAHRENHEIT										EARTH TEMPERATURE		RAINFALL						BRIGHT SUNSHINE.	
	Means of			Absolute Extremes				At 1 foot	At 4 feet	Total.	Most in a day.	Precipitation in or more	Thunderstorm	For morning obs.	Gale force 8 or more	Total.	Daily Mean.	Per cent.		
	A.	B.	Min.	Highest	Lowest	Min.	Max.													
	°F	°F	°F	°F	°F	°F	°F													
	Max.	Min.	°F	°F	°F	°F	°F													
Railway Hill, Kuala Lumpur, Selangor	89.6	72.2	80.9	94	70	83	74	83.9	84.5	12.33	313.2	2.13	23	18	1	4	137.60	4.44	37	
Bukit Jeram, Selangor	86.3	72.3	79.3	89	71	81	74	82.9	84.6	10.06	255.5	3.35	21	17	2		153.65	4.96	41	
Sitiawan, Perak	88.3	73.0	80.7	91	71	85	75	83.7	84.8	5.50	139.7	1.10	16	11	1		161.10	5.20	43	
Temerloh, Pahang	88.2	72.9	80.5	91	71	84	75	84.6	85.9	10.28	261.1	1.79	22	17	2	9	168.90	5.45	45	
Kuala Lipis, Pahang	87.4	72.0	79.7	91	69	83	74	83.4	84.4	15.18	385.6	2.72	23	19	2	26	145.20	4.68	39	
Kuala Pahang, Pahang	85.0	73.8	79.4	91	72	80	76	83.6	85.4	14.97	380.3	3.60	24	22			154.60	4.99	41	
Kallang Aerodrome, S'pore	85.1	75.3	80.2	89	73	80	78	82.0	83.3	10.30	261.6	2.19	20	14	1		148.45	4.79	40	
Butterworth, Province Wellesley	85.6	73.9	79.7	88	72	80	76	83.0	83.8	13.55	344.2	3.16	23	18	1		141.35	4.56	38	
Bukit China, Malacca	83.8	73.7	78.7	87	71	81	76	82.5	83.5	11.20	284.5	1.96	20	19	1		134.40	4.34	36	
Kluang, Johore	87.7	71.1	79.4	93	69	83	73	81.8	82.3	5.71	145.0	2.20	22	16	10		122.65	3.96	33	
Bukit Lalang, Mersing, Johore	85.7	72.2	78.9	90	71	80	73	81.6	81.5	6.72	170.7	1.94	22	16	1	6	152.40	4.92	41	
Alor Star, Kedah	86.5	73.8	80.1	90	72	79	76	84.6	85.1	23.70	602.0	3.15	27	23	7		151.50	4.89	41	
Kota Bharu, Kelantan	86.8	73.8	80.3	90	72	77	75	84.2	84.9	15.91	404.1	4.01	22	19	1		161.90	5.22	43	
Kuala Trengganu, Trengganu HILL STATIONS.	85.6	72.9	79.3	90	71	77	75	82.6	84.2	13.47	342.1	2.19	25	23	2		153.80	4.96	41	
Fraser's Hill, Pahang 4268 ft.	73.2	62.2	67.7	77	60	69	64	71.0	71.7	16.03	407.2	2.00	24	22	7	6	105.75	3.41	28	
Pahang																				
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	71.6	57.9	64.7	74	54	68	61	70.5	70.0	14.96	380.0	1.76	29	27	1		104.10	3.36	28	
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft.	70.3	59.2	64.7	74	57	66	60	—	—	14.59	370.6	1.77	27	25			103.85	3.35	28	

Compiled from Returns supplied by the Meteorological Branch, Malaya

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HOME COMPANIES :

Abaco (Selangor) Rubber, Ltd.
Batang Consolidated Rubber Estates, Ltd.
Bekoh Consolidated Rubber Estates, Ltd.
Bidor Rubber Estate, Ltd.
Braunston (Malay) Rubber Estates, Ltd.
Bruas-Perak Rubber Estate, Ltd.
Bukit Kajah Rubber Co., Ltd.
Castlefield (Klang) Rubber Estate, Ltd.
Chota Rubber Estates, Ltd.
Cromlix Rubber Estate & Produce Synd., Ltd.
Damansara (Selangor) Rubber Co., Ltd.
Edensor Rubber Estate, Ltd.
Federated (Selangor) Rubber Co., (1932) Ltd.
Gan Kee Rubber Estate, Ltd.
Garing (Malacca) Rubber Estates, Ltd.
Gedong (Perak) Rubber Estate, Ltd.
Glen Muar Estates, Ltd.
Golconda (Malay) Rubber Co., Ltd.
Harpenden (Selangor) Rubber Co., Ltd.
Holyrood Rubber, Ltd.
Hongkong (Selangor) Rubber, Ltd.
Kampong Kuantan Rubber Co., Ltd.
Kenny (Selangor) Rubber Co., Ltd.
Killinghall (Rubber) Development Synd., Ltd.
Klanang Produce Co., Ltd.
Kuala Selangor Rubber Co., Ltd.
Kuala Pilah Rubber Estates, Ltd.
Kuala Pergau Rubber Plantations, Ltd.
Madingley (Malay) Rubber Estates, Ltd.
North Hummock (Selangor) Rubber Co., Ltd.
Padang Jawa Rubber Estate, Ltd.
Ratanui Rubber Limited.
Rinching Estate.
Riverside (Selangor) Rubber Co., Ltd.
Rubber Estates of Krian, Ltd.
Shelford Rubber Estate, Ltd.
Strathmore Rubber Co., Ltd.
Tehik Gong Rubber Co., Ltd.
Scottish-Malay Co., Ltd.
Selangor Oil Palm Co., Ltd.
Tennamaram Palm Oil Co., Ltd.
Tremelhye (Selangor) Rubber Co., Ltd.
Teluk Pia Rubber Estates (1914), Ltd.
Auditors—The Vallambrosa Rubber Coy., Ltd.

COLOMBO COMPANIES :

Bukit Darah (Selangor) Rubber Co., Ltd.
Ceylon Planters' Rubber Syndicate, Ltd.
Good Hope (Selangor) Rubber Co., Ltd.
Indo-Malay Estates, Ltd.
Lapan Utan Rubber Co., Ltd.
Rubber Growers Co., Ltd.
Shalimar (Malay) Estates Co., Ltd.

AGENTS AND SECRETARIES FOR THE

FOLLOWING LOCAL COMPANIES :

Amalgamated Investments, Ltd.
Avondale Estate.
Ayer Puteh Estate.
Banopdane Rubber Estate, Ltd.
Behrang River Estate Syndicate.
Broga Rubber Estates, Ltd.
Bukit Badong Rubber Estate Syndicate, Ltd.
Bukit Gajah Rubber Co., Ltd.
Bukit Kamuning Rubber Estate, Ltd.
Bukit Prang Estate, Ltd.
Bukit Hantu, Ltd.
Bukit Rimau, Ltd.
Bukit Rokan Rubber Syndicate, Ltd.
Cliveden Estate.
Empire Hotel Co., Ltd.
Federal Oil Mills, Limited.
Gold Ventures, Ltd.
Hamilton (F.M.S.) Rubber Co., Ltd.
Hawthornden Rubber Estate, Ltd.
Middle East Investments, Ltd.
Minicoy, Ltd.
Perak Oil Palms, Ltd.
Selangor Bulk Oil Installation, Ltd.
Seventh Mile Rubber Estates, Ltd.
Selangor Investments, Ltd.

AGENTS FOR THE FOLLOWING INSURANCE COMPANIES :

Batavia Sea & Fire Insurance Co., Ltd.
Gautier de Ste. Croix & Sons, Ltd.
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The Director of Agriculture invites those interested in agriculture to visit the School of Agriculture, Serdang, the Experiment or Agricultural Stations on which miscellaneous crops are cultivated and the Stations and Plots devoted to experiments in padi growing.

Intending visitors to the School of Agriculture should communicate with the Vice Principal, School of Agriculture, Serdang, Selangor.

The School and the Central Experiment Station are situated at about 14 miles by road from Kuala Lumpur and $5\frac{1}{2}$ miles from Sungai Besi Railway Station where cars are usually available for hire. "Visitors' Days" at the Plantation are on the first and third Wednesdays in each month: visitors are requested to arrive at 8.30 a.m. unless previous arrangements are made; limited accommodation is available in a hostel on the Plantation. All enquiries concerning visits should be addressed to the Senior Assistant Agriculturist, Central Experiment Station, Serdang.

Other Stations and Plots, together with the addresses of Officers to whom enquiries should be sent, are listed below:

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